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A NEW
Dictionary of Arts, Sciences, &c.

D.

D, THE fourth letter of the alphabet, and the third conſonant.

Grammarians generally reckon D among the lingual letters, as ſuppoſing the tongue to have the principal ſhare in the pronunciation thereof; though the Abbot de Dangeau ſeems to have reaſon in making it a palate letter. The letter D is the fourth in the Hebrew, Chaldee, Samaritan, Syriac, Greek, and Latin alphabets; in the five firſt of which languages it has the ſame name, though ſomewhat differently ſpoke, *e. g.* in Hebrew and Chaldee *Daleth*, in Syriac *Doleth*, and in Greek *Delta*.

The form of our D is the ſame with that of the Latins, as appears from all the ancient medals and inſcriptions; and the Latin D is no other than the Greek Δ, rounded a little, by making it quicker and at two ſtrokes. The Δ of the Greeks, again, is borrowed from the ancient character of the Hebrew *Daleth;* which form it ſtill retains, as is ſhewn by the Jeſuit Souciet, in his Diſſertation on the Samaritan Medals.

D is alſo a numeral letter, ſignifying *five hundred;* which ariſes hence, that, in the Gothic characters, the D is half the M, which ſignifies a *thouſand*. Hence the verſe,

> *Litera* D *velut* A *quingentos ſignificabit.*

A daſh added a-top, D̄, denotes it to ſtand for five thouſand.

Uſed as an abbreviation, it has various ſignifications: thus, D ſtands for Doctor; as, M. D. for Doctor of Medicine; D. T. Doctor of Theology; D. D. implies Doctor of Divinity, or "dono dedit;" D. D. D. is uſed for "dat, dicat, dedicat;" and D. D. D. D. for "dignum Deo donum dedit."

DAB, in ichthyology, the Engliſh name of a ſpecies of PLEURONECTES.

DABUL, a town of Aſia, in the Eaſt Indies, on the coaſt of Malabar, and to the ſouth of the gulf of Cambaye, on a navigable river. It was formerly very flouriſhing, but is now much decayed. It belongs to the Portugueſe, and its trade conſiſts principally in pepper and ſalt. E. Long. 73. 55. N. Lat. 17. 30.

DACCA, a town of Aſia, in the kingdom of Bengal in the Eaſt Indies, ſituated in E. Long. 89. 10. N. Lat. 24. 0.—The advantages of the ſituation of this place, and the fertility of the ſoil round it, have long ſince made it the centre of an extenſive commerce. The courts of Delhi and Muxadavad are furniſhed from thence with the cottons wanted for their own conſumption. They each of them maintain an agent on the ſpot to ſuperintend the manufacture of them; and he has an authority, independent of the magiſtrate, over the brokers, weavers, embroiderers, and all the workmen whoſe buſineſs has any relation to the object of his commiſſion. Theſe unhappy people are forbidden, under pecuniary and corporal penalties, to ſell, to any perſon whatever, a piece exceeding the value of three guineas: nor can they, but by dint of money, relieve themſelves from this oppreſſion.

In this, as in all the other markets, the Europeans treat with the Mooriſh brokers ſettled upon the ſpot, and appointed by the government. They likewiſe lend their name to the individuals of their own nation, as well as to Indians and Armenians living in their ſettlements, who, without this precaution, would infallibly be plundered. The Moors themſelves, in their private tranſactions, ſometimes avail themſelves of the ſame pretence, that they may pay only two, inſtead of five, *per cent*. A diſtinction is obſerved, in their contracts, between the cottons that are beſpoke, and thoſe which the weaver ventures, in ſome places, to manufacture on his own account. The length, the number of threads, and the price, of the former are fixed: nothing further than the commiſſion for the latter is ſtipulated, becauſe it is impoſſible to enter into the ſame detail. Thoſe nations that make a point of having fine goods, take proper meaſures that they may be enabled to advance money to their workmen at the beginning of the year. The weavers, who in general have but little employment at that time, perform their work with leſs hurry than in the months of October, November, and December, when the demand is preſſing.

Some of the cottons are delivered unbleached, and others half-bleached. It were to be wiſhed that this cuſtom might be altered. It is very common to ſee cottons, that look very beautiful, go off in the bleaching. Perhaps the manufacturers and brokers foreſee how they will turn out; but the Europeans have not ſo exquiſite a touch, nor ſuch an experienced eye to diſcern this. It is a circumſtance peculiar to India, that cottons, of what kind ſoever they are, can never be well bleached and prepared, but in the place where they are manufactured. If they have the miſfortune to get damaged before they are ſhipped for Europe, they muſt be ſent back to the places from whence they came.

DACE, in ichthyology, a ſpecies of Cyprinus.

This fiſh is extremely common in our rivers, and gives the expert angler great diverſion. The dace will bite at any fly; but he is more than ordinarily fond of the ſtone caddis, or May-fly, which is plentiful in the latter end of April, and the whole month of May. Great quantities of theſe may be gathered among the reeds or ſedges by the water-ſide; and on the hawthorn buſhes near the waters. Theſe are a large and handſome bait; but as they laſt only a ſmall part of the year in ſeaſon, recourſe is to be had to the ant-fly. Of theſe the black ones found in large mole-hills or ant-hills, are the beſt. Theſe may be kept alive a long time in a bottle, with a little of the earth of the hill, and ſome roots of graſs; and they are in ſeaſon throughout the months of June, July, Auguſt, and September. The beſt ſeaſon of all is when they ſwarm, which is in the end of July, or beginning of Auguſt; and they may be kept many months in a veſſel waſhed out with a ſolution of honey in water, even longer than with the earth and graſs-roots in the vial; though that is the moſt convenient method with a ſmall parcel taken for one day's fiſhing. In warm weather this fiſh very ſeldom refuſes a fly at the top of the water; but at other times he muſt have the bait ſunk to within three inches of the bottom. The winter fiſhing for dace requires a very different bait: this is a white maggot with a reddiſh head, which is the produce of the eggs of the beetle, and is turned up with the plough in great abundance. A parcel of theſe put in any veſſel, with the earth they were taken in, will keep many months, and are an excellent bait. Small dace may be put into a glaſs jar with freſh water; and there preſerved alive for a long time, if the water is properly changed. They have been obſerved to eat nothing but the animalcula of the water. They will grow very tame by degrees.

DACHAW, a town of Bavaria in Germany. It is pretty large, well built, and ſeated on a mountain, near the river Amber. Here the elector has a palace and fine gardens. E. Long. 11. 30. N. Lat. 48. 20.

DACIER (Andrew), born at Caſtres in Upper Languedoc, 1651, had a great genius and inclination for learning, and ſtudied at Saumur under Tannegui Le Fevre, then engaged in the inſtruction of his daughter, who proved afterwards an honour to her ſex. This gave riſe to that mutual tenderneſs which a marriage of 40 years could never weaken in them. The duke of Montauſier hearing of his merit, put him in the liſt of commentators for the uſe of the dauphin, and engaged him in an edition of *Pompeius Feſtus*, which he publiſhed in 1681. His edition of Horace printed at Paris in 10 vols in 12mo. and his other works, raiſed him a great reputation. He was made a member of the academy of inſcriptions in 1695. When the hiſtory of Lewis XIV. by medals was finiſhed, he was choſen to preſent it to his majeſty; who being informed of the pains which he had taken in it, ſettled upon him a penſion of 2000 livres, and appointed him keeper of the books of the king's cloſet in the Louvre. When that poſt was united to that of library-keeper to the king, he was not only continued in the privileges of his place during life, but the ſurvivance was granted to his wife, a favour of which there had been no inſtance before. But the death of Madam Dacier in 1720, rendered this grant, which was ſo honourable to her, ineffectual. He died Sept. 18. 1722, of an ulcer in the throat. In his manners, ſentiments, and the whole of his conduct, he was a complete model of that ancient philoſophy of which he was ſo great an admirer, and which he improved by the rules and principles of Chriſtianity.

Dacier (Anne), daughter of Tannegui le Fevre, profeſſor of Greek at Saumur in France. She early ſhewed a fine genius, which her father cultivated with great care and ſatisfaction. After her father's death ſhe went to Paris, whither her fame had already reached; ſhe was then preparing an edition of Callimachus which ſhe publiſhed in 1674. Having ſhewn ſome ſheets of it to Mr Huet, preceptor to the dauphin, and to ſeveral other men of learning at the court, the work was ſo highly admired, that the duke of Montauſier made a propoſal to her of publiſhing ſeveral Latin authors for the uſe of the dauphin. She rejected this propoſal at firſt, as a taſk to which ſhe was not equal. But the duke inſiſted upon it; ſo that at laſt he gained her conſent; upon which ſhe undertook an edition of Florus, publiſhed in 1674. Her reputation being now ſpread over all Europe, Chriſtina queen of Sweden ordered count Konigſmark to make her a compliment in her name: upon which Madamoiſelle le Fevre ſent the queen a Latin letter, with her edition of Florus: to which her maieſty wrote an obliging anſwer; and not long after ſent her another letter, to perſuade her to abandon the Proteſtant religion, and made her conſiderable offers to ſettle at her court. In 1683, ſhe married Mr Dacier; and ſoon after declared her deſign to the duke of Montauſier and the biſhop of Meaux, of reconciling herſelf to the church of Rome, which ſhe had entertained for ſome time: but as Mr Dacier was not yet convinced of the reaſonableneſs of ſuch a change, they retired to Caſtres in 1684, where they had a ſmall eſtate, in order to examine the points of controverſy between the Proteſtants and the Roman Catholics. They at laſt determined in favour of the latter, and made their public abjuration in 1685. After this, the king gave both huſband and wife marks of his favour. In 1693, ſhe applied herſelf to the education of her ſon and daughter, who made a prodigious progreſs: the ſon died in 1694, and the daughter became a nun in the abbey of Longchamp. She had another daughter, who had united in her all the virtues and accompliſhments that could adorn the ſex; but ſhe died at 18. Her mother has immortalized her memory in the preface to her tranſlation of the Iliad. Madam Dacier was in a very infirm ſtate of health the two laſt years of her life; and died, after a very painful ſinkneſs, Auguſt 17. 1720, aged 69. She was remarkable for her firmneſs, generoſity, equality of temper, and piety.

DACTYL, in poetry, a metrical foot, conſiſting of one long and two ſhort ſyllables; as, *carmina*, *evident*, *excellence*.

The dactyl and ſpondee are the only feet uſed in hexameter verſes. See Hexameter.

DACTYLI idæi; the *Fingers of Mount Ida*. Concerning theſe, Pagan theology and fable give very different accounts. The Cretans paid divine worſhip to them, as thoſe who had nurſed and brought up the god Jupiter; whence it appears, that they were the ſame as the Corybantes and Curetes. Nevertheleſs Strabo makes them different; and ſays, that the tradition in Phrygia was, that "Curetes and Corybantes were deſcended from the Dactyli Idæi: that there were originally an hundred men in the iſland, who were called *Dactyli Idæi*; from whom ſprang nine Curetes, and each of theſe nine produced ten men, as many as the fingers of a man's two hands; and that this gave the name to the anceſtors of the *Dactyli Idæi*." He relates another opinion, which is, that there were but five *Dactyli Idei*; who, according to Sophocles, were the inventors of iron: that theſe five brothers had five ſiſters, and that from this number they took the name of *fingers of mount Ida*, becauſe they were in number ten; and that they worked at the foot of this mountain. Diodorus Siculus reports the matter a little differently. He ſays "the firſt inhabitants of the Iſland of Crete were the *Dactyli Idæi*, who had their reſidence on mount Ida: that ſome ſaid, they were an hundred; others only five, in number equal to the fingers of a man's hand, whence they had the name of *Dactyli*: that they were magicians, and addicted to myſtical ceremonies: that Orpheus was their diſciple, and carried their myſteries into Greece: that the Dactyli invented the uſe of iron and fire, and that they had been recompenſed with divine honours."

Diomedes the Grammarian ſays, The Dactyli Idæi were prieſts of the goddeſs Cybele: called *Idei*, becauſe that goddeſs was chiefly worſhipped on mount Ida in Phrygia; and *Dactyli*, becauſe that, to prevent Saturn from hearing the cries of infant Jupiter, whom Cybele had committed to their cuſtody, they uſed to ſing certain verſes of their own invention, in the Dactylic meaſure. See Curetes and Corybantes.

DACTYLIS, Cock's-foot grass; a genus of the digynia order, belonging to the triandria claſs of plants. There are two ſpecies, the cynoſuroides or ſmooth cock's-foot graſs, and the glomeratus or rough cock's-foot graſs. Both are natives of Britain: the firſt grows in marſhy places, and the latter is common in meadows and paſture-grounds. This laſt is eat by horſes, ſheep, and goats; but refuſed by cows.

DACTYLUS in zoology, a name given by Pliny to the Pholas.

DADUCHI, in antiquity, prieſts of the goddeſs Ceres, ſo called, becauſe at the feaſts and ſacrifices of that goddeſs, they ran about the temple, carrying a lighted torch, which they delivered from hand to hand, till it had paſſed through them all. This they did in memory of Ceres's ſearching for her daughter Proſerpine, by the light of a torch, which ſhe kindled in mount Ætna.

DÆDALUS, an ingenious Athenian artiſt, who invented divers mechanical inſtruments, as the ſaw, &c. and made walking ſtatues, with their eyes rolling as if alive. He threw his brother's ſon out of a window, for fear he ſhould excel him in his art, becauſe he had invented the potter's wheel: whereupon he fled into Crete to king Minos, and carried his ſon Icarus along with him. There he built the celebrated labyrinth; in which he and his ſon were ſhut up, becauſe of his having ſerved Paſiphaë the queen in her baſe amours: he, however, made himſelf and his ſon wings, by which he eſcaped; but his ſon not obſerving his directions, fell into the ſea and was drowned. He fled to Cocalus king of Egypt, who cauſed him to be choaked in a ſtove, to prevent Minos's making war againſt him on his account. He is ſaid to have lived about the year 2600. He made many famous works at Memphis in Egypt, where the inhabitants paid him divine honours.

DÆMON, a name given by the ancients to certain ſpirits, or genii, which appeared to men, either to do them ſervice, or to hurt them. The Platoniſts diſtinguiſh between gods, dæmons, and heroes. The gods are thoſe whom Cicero calls *Dii majorum gentium*. The dæmons are thoſe whom we call *angels*. Chriſtians, by the word *dæmon*, underſtand only evil ſpirits, or devils.

DÆMONIAC, a word applied to a perſon ſuppoſed to be poſſeſſed with an evil ſpirit, or Dæmon.

Dæmoniacs, in church-hiſtory, a branch of the anabaptiſts; whoſe diſtinguiſhing tenet is, that the devils ſhall be ſaved at the end of the world.

DAFFY's elixir. See Pharmacy, n° 421.

DAGNO, a town of Turky in Europe, in Albania, with a biſhop's ſee. It is the capital of the diſtrict of Ducagini, and it is ſeated on the rivers Drino and Nero, near their confluence. It is 15 miles ſouth-eaſt of Scutari, and 15 north-eaſt of Aleſſio. E. Long. 19. 48. N. Lat. 42. 0.

DAGO, or Dagho, an iſland in the Baltic Sea, on the coaſt of Livonia, between the gulph of Finland and Riga. It is of a triangular figure, and may be about 20 miles in circumference. It has nothing conſiderable but two caſtles, called *Daggerwort* and *Paden*. E. Long. 22. 30. N. Lat. 58. 48.

DAGON, the falſe god of Aſhdod *, or, as the Greeks call it, *Azotus*. He is commonly repreſented as a monſter, half man and half fiſh: whence moſt learned men derive his name from the Hebrew *dag*, which ſignifies a *fiſh*. Thoſe, who make him to have been the inventer of *bread-corn*, derive his name from the Hebrew *Dagan*, which ſignifies *frumentum*; whence Philo Biblius calls him Ζευς Αρατριος, *Jupiter Aratrius*.

This deity continued to have a temple at Aſhdod, during all the ages of idolatry, to the time of the Maccabees. For the author of the firſt book of Maccabees tells us, that "Jonathan, one of the Maccabees, having beaten the army of Apollonius, Demetrius's general, they fled to Azotus, and entered into Bethdagon (the temple of their idol); but that Jonathan ſet fire to Azotus, and burnt the temple of Dagon, and all thoſe who were fled into it.

Dagon, according to ſome, was the ſame with Jupiter, according to others Saturn, according to others Venus, and according to moſt Neptune.

DAHGESTAN, a country of Aſia, bounded by Circaſſia on the north, by the Caſpian ſea on the eaſt, by Chirvein a province of Perſia on the ſouth, and by Georgia on the weſt. Its chief towns are Tarku and Derbent, both ſituated on the Caſpian Sea.

DAHOME, a kingdom of Africa, on the coaſt of Guinea, to the north of Whidah, or Fida. The king of this country conquered Whidah, and very much diſturbed the ſlave-trade of the Europeans.

DAILLIE (John), a Proteſtant miniſter near Paris,

* See 1 Sam. chap. v.

ris, was one of the moſt learned divines of the 17th century, and was the moſt eſteemed by the Catholics, of all the controverſial writers among the Proteſtants. He was tutor to two of the grandſons of the illuſtrious Mr Du Pleſſis Mornai. Mr Daille having lived 14 years with ſo excellent a maſter, travelled into Italy with his two pupils: one of them died abroad; with the other he ſaw Italy, Switzerland, Germany, Flanders, Holland, and England, and returned in 1621. He was received miniſter in 1623, and firſt exerciſed his office in the family of Mr Du Pleſſis Mornai; but this did not laſt long, for that lord died ſoon after. The memoirs of this great man employed Mr Daille the following year. In 1625 he was appointed miniſter of the church of Saumur, and in 1626 removed to Paris. He ſerved all the reſt of his life in the ſervice of this laſt church, and compoſed ſeveral works: his firſt piece was his maſter-piece, and an excellent work, *Of the Uſe of the Fathers*, printed 1631. It is a ſtrong chain of reaſoning, which forms a moral demonſtration againſt thoſe who would have religious diſputes decided by the authority of the fathers. He died in 1670, aged 77.

DAISY. See Bellis.

Ox-Eye Daisy. See Buphthalmum.

DALACA, an iſland of the Red Sea, over-againſt the coaſt of Abex, about 72 miles in length, and 15 in breadth. It is very fertile, populous, and remarkable for a pearl fiſhery. The inhabitants are negroes, and great enemies to the Mahometans. There is a town of the ſame name ſeated over-againſt Abaſſia.

DALEBURG, a town of Sweden, and capital of the province of Dalia, ſeated on the weſtern bank of the lake Wener, 50 miles north of Gottenburg. E. Long. 13. 0. N. Lat. 59. 0.

DALECARLIA, a province of Sweden, ſo called from a river of the ſame name, on which it lies, near Norway. It is divided into three parts, which they call *valleys;* and is about 175 miles in length, and 100 in breadth. It is full of mountains, which abound in mines of copper and iron, ſome of which are of a prodigious depth. The towns are very ſmall, and Idra is the capital. The inhabitants are rough, robuſt, and warlike; and all the great revolutions in Sweden had their riſe in this province. The river riſes in the Dofrine mountains; and, running ſouth-eaſt thro' the province, falls into the gulph of Bothnia.

DALECHAMP (James), a phyſician in Normandy, in the 16th century, wrote a hiſtory of plants, and was well ſkilled in polite learning. He wrote notes on Pliny's natural hiſtory, and tranſlated Athenæus into Latin.

DALECHAMPIA, in botany; a genus of the monadelphia order, belonging to the monœcia claſs of plants. There is but one ſpecies, *viz.* the ſcandens, a native of Jamaica. It is a climbing plant, which riſes to a conſiderable height; and is remarkable for nothing but having its leaves armed with briſtly hairs, which ſting the hands of thoſe who unwarily touch them.

DALEM, a town of the United Provinces, and capital of a diſtrict of the ſame name. It was taken by the French in 1672, who demoliſhed the fortifications. It is ſeated on the river Bervine, five ſmiles north-eaſt of Liege. E. Long. 5. 59. N. Lat. 50. 40.

DALEA, a province of Sweden, bounded on the north by Dalecarlia, on the eaſt by the Wermeland and the lake Wener, on the ſouth by Gothland, and on the north by Norway and the ſea.

DALKEITH, a town of Scotland, in Mid-Lothian, 6 miles ſouth-eaſt of Edinburgh. W. Long. 2. 20. N. Lat. 55. 50.

DALMATIA, a province of Europe; bounded on the north by Boſnia, on the ſouth by the gulph of Venice, on the eaſt by Servia, and on the weſt by Morlachia. Spalatro is the capital of that part belonging to the Venetians; and Raguza, of a republic of that name: the Turks have a third, whoſe capital is Herzegovina. The air is wholeſome, and the ſoil fruitful; and it abounds in wine, corn, and oil.

DALTON, a town of Lancaſhire, in England. It is ſeated on the ſpring-head of a river, in a champaign country, not far from the ſea; and the ancient caſtle is made uſe of to keep the records, and priſoners for debt in the liberty of Furnes. W. Long. 3. 0. N. Lat. 54. 18.

Dalton (John), D. D. an eminent divine and poet, was the ſon of the rev. Mr John Dalton, rector of Deane, near Whitehaven in Cumberland, where he was born in 1709. He was educated at Queen's college, Oxford; and became tutor or governor to the lord Beauchamp, only ſon of the earl of Hertford, late duke of Somerſet; during which time he adapted Milton's admirable Maſque of Comus to the ſtage, by a judicious inſertion of ſeveral ſongs and different paſſages ſelected from other of Milton's works, as well as of ſeveral ſongs and other elegant additions of his own, ſuited to the characters and to the manner of the original author. During the run of this piece he induſtriouſly ſought out a grand-daughter of Milton's, oppreſſed both by age and poverty; and procured her a benefit from it, the profits of which amounted to a very conſiderable ſum. He was promoted by the king to a prebend of Worceſter; where he died, on the 22d of July 1763. Beſides the above, he wrote a deſcriptive poem, addreſſed to two ladies at their return from viewing the coal-mines near Whitehaven; and Remarks on 12 hiſtorical deſigns of Raphael, and the *Muſeum Græcum & Egyptiacum.*

DAMA, in zoology. See Cervus.

DAMAGE, in law, is generally underſtood of a hurt or hindrance attending a perſon's eſtate: but, in common law, it is part of what the jurors are to inquire of in giving verdict for the plaintiff or defendant, in a civil action, whether real or perſonal; for, after giving verdict on the principal cauſe, they are likewiſe aſked their conſciences, touching coſts and damages, which contain the hindrances that one party hath ſuffered from the wrong done him by the other. See Costs.

DAMAN, a maritime town of the Eaſt-Indies, at the entrance into the gulph of Cambay. It is divided by the river Daman into two parts; one of which is called *New Daman*, and is a handſome town, well fortified, and defended by a good Portugueſe garriſon. The other is called *Old Daman*, and is very ill built. There is a harbour between the two towns, defended by a fort. It was taken by the Portugueſe in 1535. The mogul has attempted to get poſſeſſion of it ſeveral times, but always without effect. E. Long. 72. 35. N. Lat. 21. 5.

DAMASCENUS (John), an illuſtrious father of the church in the 8th century, born at Damaſcus, where his father, though a Chriſtian, enjoyed the office of counſellor of ſtate to the Saracen caliph; to which the ſon ſucceeded. He retired afterwards to the monaſtery of St Sabas, and ſpent the remainder of his life in writing books of divinity. His works have been often printed; but the Paris edition in 1712, 2 vols folio, is eſteemed the beſt.

DAMASCIUS, a celebrated heathen philoſopher, born at Damaſcus in the year 540, when the Goths reigned in Italy. He wrote the life of his maſter Iſidorus; and dedicated it to Theodora, a very learned and philoſophical lady, who had alſo been a pupil to Iſidorus. In this life, which was copiouſly written, he frequently made oblique attacks on the Chriſtian religion. We have nothing remaining of it but ſome extracts preſerved by Photius. Damaſcius ſucceeded Theon in the rhetorical ſchool, and Iſidorus in that of philoſophy, at Athens.

DAMASCUS, a very ancient city of Syria in Aſia, ſeated in E. Long. 47. 18. N. Lat. 33. 0. Some of the ancients ſuppoſe this city to have been built by one Damaſcus, from whom it took its name; but the moſt generally received opinion is, that it was founded by Uz the eldeſt ſon of Aram. It is certain, from *Gen.* xiv. 5. that it was in being in Abraham's time, and conſequently may be looked upon as one of the moſt ancient cities in the world. In the time of king David it ſeems to have been a very conſiderable place; as the ſacred hiſtorian tells us, that the Syrians of Damaſcus ſent 20,000 men to the relief of Hadadezer king of Zobah. We are not informed whether at that time it was governed by kings, or was a republic. Afterwards, however, it became a monarchy which proved very troubleſome to the kingdom of Iſrael, and would even have deſtroyed it entirely, had not the Deity miraculouſly interpoſed in its behalf. At laſt this monarchy was deſtroyed by Tiglath Pileſer king of Aſſyria, and Damaſcus was never afterwards governed by its own kings. From the Aſſyrians and Babylonians it paſſed to the Perſians, and from them to the Greeks under Alexander the Great. After his death it belonged, with the reſt of Syria, to the Seleucidæ; till their empire was ſubdued by the Romans, about 70 years before Chriſt. From them it was taken by the Saracens in 633; and it is now in the hands of the Turks.—Notwithſtanding the tyranny of the Turkiſh government, Damaſcus is ſtill a conſiderable place. It is ſituated in a plain of ſo great extent, that one can but juſt diſcern the mountains which compaſs it on the other ſide. It ſtands on the weſt ſide of the plain, about two miles from the head of the river Barrady, which waters it. It is of a long, ſtrait figure, extending about two miles in length, adorned with moſques and ſteeples, and encompaſſed with gardens computed to be full 30 miles round. The river Barrady, as ſoon as it iſſues from the clefts of the Antilibanus into the plain, is divided into three ſtreams, whereof the middlemoſt and biggeſt runs directly to Damaſcus, and is diſtributed to all the ciſterns and fountains of the city. The other two ſeem to be artificial; and are drawn round, one to the right, and the other to the left, on the borders of the gardens, into which they are let by little currents, and diſperſed every where. The houſes of the city, whoſe ſtreets are very narrow, are all built on the outſide either with ſun-burnt brick, or Flemiſh wall: and yet it is no uncommon thing to ſee the gates and doors adorned with marble portals, carved and inlaid with great beauty and variety; and within theſe portals to find large ſquare courts beautified with fragrant trees and marble fountains, and compaſſed round with ſplendid apartments. In theſe apartments the ceilings are uſually richly painted and gilded; and their duans, which are a ſort of low ſtages ſeated in the pleaſanteſt part of the room, and elevated about 16 or 18 inches above the floor, whereon the Turks eat, ſleep, ſay their prayers, &c. are floored, and adorned on the ſides with variety of marble mixed in moſaic knots and mazes, ſpread with carpets, and furniſhed all round with bolſters and cuſhions, to the very height of luxury. In this city are ſhewn the church of John the Baptiſt, now converted into a famous moſque; the houſe of Ananias, which is only a ſmall grotto or cellar wherein is nothing remarkable; and the houſe of Judas with whom Paul lodged. In this laſt is an old tomb, ſuppoſed to be that of Ananias; which the Turks hold in ſuch veneration, that they keep a lamp continually burning over it. There is a caſtle belonging to Damaſcus, which is like a little town, having its own ſtreets and houſes; and in this caſtle a magazine of the famous Damaſcus ſteel was formerly kept. The fruit-tree called the *damaſcene*, and the flower called the *damaſk roſe*, were tranſplanted from the gardens belonging to this city; and the ſilks and linens known by the name of *damaſks*, were probably invented by the inhabitants.

DAMASK, a ſilk ſtuff, with a raiſed pattern, ſo as that the right ſide of the damaſk is that which hath the flowers raiſed or ſattined.

Damaſks ſhould be of dreſſed ſilk, both in warp and woof; and, in France, half an ell in breadth: they are made at Chalons in Champagne, and in ſome places in Flanders, as at Tournay, &c. entirely of wool, $\frac{3}{8}$ of an ell wide, and 20 ells long.

DAMASK is alſo applied to a very fine ſteel, in ſome parts of the Levant, chiefly at Damaſcus in Syria; whence its name. It is uſed for ſword and cutlaſs blades, and is finely tempered.

DAMASKEENING, or DAMASKING, the art or operation of beautifying iron, ſteel, &c. by making inciſions therein, and filling them up with gold or ſilver wire; chiefly uſed for adorning ſword-blades, guards and gripes, locks of piſtols, &c.

Damaſkeening partakes of the moſaic, of engraving, and of carving: like the moſaic, it has inlaid work; like engraving, it cuts the metal, repreſenting divers figures; and, as in chaſing, gold and ſilver is wrought in relievo. There are two ways of damaſking: the one, which is the fineſt, is when the metal is cut deep with proper inſtruments, and inlaid with gold and ſilver wire: the other is ſuperficial only.

DAMELOPRE, a kind of bilander, uſed in Holland for conveying merchandiſe from one canal to another; being very commodious for paſſing under the bridges.

DAMIANISTS, in church-hiſtory, a branch of the ancient acephali-ſeveritæ. They agreed with the catholics in admitting the IVth council, but diſowned any diſtinction of perſons in the Godhead; and profeſſed one ſingle nature, incapable of any difference:

yet they called God "the Father, Son, and Holy Ghoſt."

DAMIETTA, a port-town of Egypt, ſituated on the eaſtern mouth of the river Nile, four miles from the ſea, and 100 miles north of Grand Cairo. E. Long. 32°, and N. Lat. 31°.

DAMON, a philoſopher B. C. 400, was ſo cloſely connected in friendſhip with his collegue Pythias, that Dionyſius having ſentenced one of them to death, permitted Damon to ſettle his affairs accordingly, on condition of finding a ſurety to return, which Pythias undertook. Damon coming at the time appointed, the tyrant admiring their friendſhip, pardoned them.

DAMPIER (William), a famous navigator, deſcended from a good family in Somerſetſhire in England, was born in 1652. Loſing his father when very young, he was ſent to the ſea, where he ſoon diſtinguiſhed himſelf, particularly in the South Sea. His voyage round the world is well known, and has gone through many editions. He appears afterward to have engaged in the Briſtol expedition with Captain Woods Rogers; who ſailed in Auguſt 1708, and returned in September 1711: but we have no farther particulars of his life or death.

DAMPS, in natural hiſtory, (from the Saxon word *damp*, ſignifying vapour or exhalation), are certain noxious exhalations iſſuing from ſome parts of the earth, and which prove almoſt inſtantly fatal to thoſe who breathe them.

Theſe damps are chiefly obſerved in mines and coal-pits: though vapours of the ſame kind often iſſue from old lavas of burning mountains; and, in thoſe countries where volcanos are common, will frequently enter houſes, and kill people ſuddenly without the leaſt warning of their approach. In mines and coal-pits they are chiefly of two kinds, called by the miners and colliers the *choke* and *fire damps;* and both go under one general name of *foul air*. The *choke-damp* is very much of the nature of fixed air; and uſually infeſts thoſe places which have been formerly worked, but lyen long neglected, and are known to the miners by the name of *waſtes*. No place, however, can be reckoned ſafe from this kind of damps, except where there is a due circulation of air; and the procuring of this is the only proper means of preventing accidents from damps of all kinds. The choke-damp ſuffocates the miners ſuddenly, with all the appearances found in thoſe that are ſuffocated by fixed air. Being heavy, it deſcends towards the loweſt parts of the workings, and thus is dangerous to the miners, who can ſcarce avoid breathing it. The *fire-damp*, which ſeems chiefly to be compoſed of inflammable air, riſes to the roof of the workings, as being ſpecifically lighter than the common atmoſphere; and hence, though it will ſuffocate as well as the other, it ſeldom proves ſo dangerous in this way as by its inflammable property, by which it often takes fire at the candles, and explodes with extreme violence.

In the Phil. Tranſ. n° 119. there is an account of ſome exploſions by damps of this kind, on which we have the following obſervations. 1. Thoſe who are in the place where the vapour is fired, ſuddenly find themſelves ſurrounded with flames, but hear little or no noiſe; though thoſe who are in places adjacent, or above ground, hear a very great one. 2. Thoſe who are ſurrounded by the inflamed vapour feel themſelves ſcorched or burnt, but are not moved out of their places, though ſuch as unhappily ſtand in the way of it are commonly killed by the violence of the ſhock, and often thrown with great force out at the mouth of the pit; nor are the heavieſt machines found able to reſiſt the impetuoſity of the blaſt. 3. No ſmell is perceived before the fire, but a very ſtrong one of brimſtone is afterwards felt. 4. The vapour lies towards the roof, and is not perceived if the candles are held low; but when theſe are held higher, the damp deſcends like a black miſt, and catches hold of the flame, lengthening it to two or three handfuls; and this appearance ceaſes when the candles are held nearer the ground. 5. The flame continues in the vault for ſeveral minutes after the crack. 6. Its colour is blue, ſomething inclining to green, and very bright. 7. On the exploſion of the vapour, a dark ſmoke like that proceeding from fired gunpowder is perceived. 7. Damps are generally obſerved to come about the latter end of May, and to continue during the heat of ſummer. They return ſeveral times during the ſummer ſeaſon, but obſerve no certain rule.

Beſides theſe kind of damps, which are very common, we find others deſcribed in the Philoſophical Tranſactions, concerning the nature of which we can ſay nothing. Indeed the account ſeems ſomewhat ſuſpicious. They are given by Mr Jeſſop, from whom we have the foregoing obſervations concerning the fire-damp, and who had theſe from the miners in Derbyſhire. After deſcribing the common damp, which conſiſts of fixed air, "They call the ſecond ſort (ſays he) the *peaſe-bloom damp*, becauſe, as they ſay, it ſmells like peaſe-bloom. They tell me it always comes in the ſummer-time; and thoſe grooves are not free which are never troubled with any other ſort of damps. I never heard that it was mortal; the ſcent, perhaps, freeing them from the danger of a ſurpriſe: but by reaſon of it many good grooves lie idle at the beſt and moſt profitable time of the year, when the ſubterraneous waters are the loweſt. They fancy it proceeds from the multitude of red-trefoil flowers, by them called *honeyſuckles*, with which the limeſtone meadows in the Peake do much abound. The third is the ſtrangeſt and moſt peſtilential of any; if all be true which is ſaid concerning it. Thoſe who pretend to have ſeen it, (for it is viſible), deſcribe it thus: In the higheſt part of the roof of thoſe paſſages which branch out from the main groove, they often ſee a round thing hanging, about the bigneſs of a foot-ball, covered with a ſkin of the thickneſs and colour of a cobweb. This they ſay, if it is broke by any accident, as the ſplinter of a ſtone, or the like, diſperſeth itſelf immediately, and ſuffocates all the company. Therefore, to prevent caſualties, as ſoon as they have eſpied it, they have a way, by the help of a ſtick and long rope, of breaking it at a diſtance; which done, they purify the place well with fire, before they dare enter it again. I dare not avouch the truth of this ſtory in all its circumſtances, becauſe the proof of it ſeems impoſſible, ſince they ſay it kills all that are likely to bear witneſs to the particulars: neither dare I deny, but ſuch a thing may have been ſeen hanging on the roof, ſince I have heard many affirm it."—Some damps, ſeemingly of the ſame nature with thoſe laſt mentioned, are noticed by the author of the Chemical Dictionary, under the word

Damps. "Amongſt the noxious mineral exhalations, (ſays he), we may place thoſe which are found in the mines of ſal-gem in Poland. Theſe frequently appear in form of light flocks, threads, and ſpiders webs. They are remarkable for their property of ſuddenly catching fire at the lamps of the miners with a terrible noiſe and exploſion. They inſtantly kill thoſe whom they touch. Similar vapours are found in ſome mines of foſſil coal."

With regard to damps, it is a queſtion well worth deciding, Whether they are occaſioned by a ſtagnation of the common atmoſphere in the pit, impregnating itſelf by degrees with various noxious effluvia; or whether they are occaſioned by ſome imperceptible operation of nature within the bowels of the earth itſelf?—As the choke-damp is often to be met with in old waſtes, it would ſeem, that the air in thoſe places becomes noxious merely from ſtagnation. But from ſome accounts given by thoſe who are converſant in coal-mines, it appears that theſe damps, the inflammable ones eſpecially, iſſue from particular places in great quantity, and often very ſuddenly; and that very dangerous effects will follow from merely beating on thoſe places with a hammer. It cannot be denied, however, but that theſe accounts muſt be ſuſpicious: for philoſophers ſeldom viſit thoſe regions, at leaſt with a deſign to take up their abode in them; and the workmen are no doubt apt to indulge the natural paſſion for the marvellous, in all their accounts of ſuch phenomena. In the Phil. Tranſ. nº 136, we have the following account of a fire-damp which ſeemed plainly to iſſue from the earth. "This work is upon a coal of five yards in thickneſs, and hath been begun upon about ſix or eight and thirty years ago. When it was firſt found, it was extreme full of water, ſo that it could not be wrought down to the bottom of the coal; but a *witchet*, or cave, was driven out of the middle of it, upon a level for gaining room to work, and drawing down the ſpring of water that lies in the coal to the eye of the pit. In driving of which witchet, after they had gone a conſiderable way under ground, and were ſcanted of wind, the fire-damps did begin by little and little to breed, and to appear in crevices and ſlits of the coal, where water had lien before the opening of the coal, with a ſmall bluiſh flame, working and moving continually; but not out of its firſt ſeat, unleſs the workmen held their candles to it; and then being weak, the blaze of the candle would drive it with a ſudden fizz, away to another crevice, where it would ſoon after appear blazing and moving as formerly. This was the firſt knowledge of it in this work, which the workmen made but a ſport of; and ſo partly neglected, till it had gotten ſome ſtrength; and then upon a morning, the firſt collier that went down, going forwards in the witchet with his candle in his hand, the damp preſently darted out ſo violently at his candle, that it ſtruck the man clear down, ſinged all his hair and clothes, and diſabled him from working for a while after. Some other ſmall warnings it gave them, inſomuch that they reſolved to employ a man on purpoſe that was more reſolute than the reſt, to go down a while before them every morning, to chaſe it from place to place, and ſo to weaken it. His uſual manner was to put on the worſt rags he had, and to wet them all in water, and when he came within the danger of it, then he fell down groveling upon his belly, and ſo went forward, holding in one hand a long wand or pole, at the head whereof he tied candles burning, and reached them by degrees towards it; then the damp would fly at them, and, if it miſſed of putting them out, would quench itſelf with a blaſt, and leave an ill-ſcented ſmoke behind. Thus they dealt with it till they had wrought the coal down to the bottom, and the water following, and not remaining as before in the body of it, among ſulphureous and braſſy metal that is in ſome veins of the coal, the fire-damp was not ſeen nor heard of till the latter end of the year 1675, which happened as followeth.

"After long working of this coal, it was found upon the riſing grounds, that there lay another roach of coal at the depth of 14 yards under it, which proved to be 3½ yards thick, and ſomething more ſulphureous. This encouraged us to ſink in one of the pits we had formerly uſed on the five-yards coal.—As we ſunk the lower part of it, we had many appearances of the fire-damp in the watery crevices of the rocks we ſunk thro', flaſhing and darting from ſide to ſide of the pit, and ſhewing rainbow-like colours upon the ſurface of the water in the bottom; but upon drawing up of the water with buckets, which ſtirred the air in the pit, it would leave burning, till the colliers at work, with their breath and ſweat, and the ſmoke of their candles, thickened the air in the pit, and then it would appear again; they lighted their candles at it ſometimes when they went out; and ſo in this pit it did no further harm."

In another pit, however, it ſoon appeared, and at laſt produced a moſt terrible exploſion. This was occaſioned by one of the workmen going imprudently down with a lighted candle, after a ceſſation of work for ſome days, and the force exerted by it ſeemed equal to that of gunpowder.—Many very terrible accidents are alſo daily known to happen from vapours of this kind; but from any hiſtories of theſe caſes which can yet be obtained, no certain theory of the formation of theſe vapours can be eſtabliſhed. Doctor Prieſtley hath indeed ſhewed, that inflammable air may be produced artificially in a great number of ways. It ariſes from a mixture of iron-filings and oil of vitriol or ſpirit of ſalt; and therefore the fire-damp hath been thought to proceed from large quantities of pyrites. But it is alſo produced from vegetable and animal ſubſtances in great quantities by diſtillation; and even from ſeveral metals by heat only, without any acid. From a letter by Doctor Franklin to Doctor Prieſtley, it appears, that inflammable vapours riſe up even from the bottom of ponds of water in ſome places, take fire on the ſurface, and will burn for two or three ſeconds.—It doth not appear that theſe artificial methods of procuring inflammable air can throw the ſmalleſt light upon the natural proceſſes by which it is produced in mines, or at the bottom of the waters above-mentioned. The ſuppoſition of its being produced by pyrites in a manner analagous to that from oil of vitriol and iron-filings can by no means be admitted: for the pyrites produce no acid capable of acting upon iron, unleſs after long expoſure to the air; neither do they contain any iron in its metalline form, which is abſolutely neceſſary to the ſucceſs of the experiment. Though a mixture of iron-filings and brimſtone will take fire from being expoſed to the air, or even if ſlightly covered with earth, yet if covered with water, though the mixture ſwells and turns black, it does not generate the leaſt quantity of inflammable vapour.

The difficulty is ſtill greater with regard to fixed air. This is well known to have iſſued from many parts of the earth, for a number of ages together; particularly the Grotto del Cani in Italy. Now, though we know that this kind of air is diſcharged in great quantity from fermenting and putrefying ſubſtances, and alſo from earthy ones when calcined by heat, it ſeems altogether impoſſible, upon theſe principles, to account for ſuch a conſtant and regular production of this kind of air in the cavern above-mentioned.—The greateſt quantity of fermenting or putrefying ſubſtances we can imagine, muſt in time have finiſhed their fermentation or putrefaction, and then ceaſed to diſcharge this kind of air; and the like muſt have happened with any quantity of calcareous matter we can ſuppoſe to be ſubjected to the action of ſubterraneous heat. It ſeems probable, therefore, that nature hath ſome method of producing theſe kinds of air which hath not yet been imitated by any artificial proceſſes; and, in all probability, both fixed and inflammable air anſwer ſome purpoſes in the natural operations which are as yet unknown to us.—Concerning this, the author of the Chemical Dictionary offers the following conjecture. "Almoſt all chemiſts and metallurgiſts agree in believing, that mineral exhalations contribute to the production of metals. This opinion is ſo much more probable, that, as phlogiſton is one of the principles of metals, (if it be be true that theſe mineral exhalations are nothing elſe than phlogiſton), and as this principle is then in a ſtate of vapour, and conſequently much divided, perhaps reduced to its ſmalleſt integrant particles, it is then in its moſt favourable ſtate for combination: it is therefore probable, that when theſe exhalations meet earths diſpoſed to receive them, they combine more or leſs intimately with thoſe earths, according to their nature. Perhaps this is the chief operation of the grand myſtery of metalliſation."

DAMSEL, from the French *damoiſel* or *damoiſeau*, an appellation anciently given to all young people of either ſex, that were of noble or genteel extraction, as the ſons and daughters of princes, knights, and barons: thus we read of Damſel Pepin, Damſel Louis le Gros, Damſel Richard prince of Wales.

From the ſons of kings this appellation firſt paſſed to thoſe of great lords and barons, and at length to thoſe of gentlemen who were not yet knights.

At preſent, damſel is applied to all maids or girls not yet married, provided they be not of the vulgar.

DANAE, in antiquity, a coin ſomewhat more than an obolus, uſed to be put into the mouths of the dead, to pay their paſſage over the river Acheron.

Danae, in fabulous hiſtory, daughter to Acriſius, king of Argos; who being informed by an oracle, that he ſhould be killed by her ſon, ſhut her up in a caſtle of braſs to prevent it: but Jupiter transforming himſelf into a ſhower of gold, or, in other words, corrupting her guards, he obtained acceſs to her; and Danaë becoming pregnant, brought forth Perſeus, who at length killed Acriſius.

DANAIDES, in the ancient mythology, the daughters of Danais, or Danaus, eleventh king of Argos, and brother of Ægyptus.—They were 50 in number, and were eſpouſed to the 50 ſons of their uncle Ægyptus. Danaus, fearing the accompliſhment of an oracle which had foretold that he ſhould be expelled his kingdom by a ſon-in-law, perſuaded his daughters to murder each of them her huſband the firſt night; which they performed, all but Hypermeneſtra, who ſpared her huſband Lynceus.—In vengeance for this crime of the 49 Danaides, the poets have condemned them to hell, to be continually employed in filling a caſk perforated at the bottom.—The Danaides are ſometimes alſo called *Belides*, from their father, who was the ſon of the Ægyptian Belus. Hyginus has preſerved the names of 47 of them.

DANAUS, in fabulous hiſtory, king of Argos, was, according to ſome authors, an Egyptian, and the brother of Ramaſſes. After having reigned nine years in conjunction with his brother, he, it is ſaid, was forced to ſeek an aſylum in the country of Argos, which he erected into a kingdom B. C. 1476; but was dethroned by his nephew Danaus. See the preceding article.

DANCE, or Dancing, as at preſent practiſed, may be defined, "an agreeable motion of the body, adjuſted by art to the meaſures or tune of inſtruments, or of the voice."—But, according to what ſome people reckon more agreeable to the true genius of the art, dancing is "the art of expreſſing the ſentiments of the mind, or the paſſions, by meaſured ſteps or bounds that are made in cadence by regulated motions of the body, and by graceful geſtures; all performed to the ſound of muſical inſtruments, or of the voice."

There is no account of the original of the practice of dancing among mankind. It is found to exiſt among all nations whatever, even the moſt rude and barbarous; and, indeed, however much the aſſiſtance of art may be neceſſary to make any one perfect in the practice, the foundation muſt certainly lie in the mechaniſm of the human body itſelf.

The connection that there is between certain ſounds and thoſe motions of the human body called *dancing*, hath ſeldom or never been inquired into by philoſophers, though it is certainly a very curious ſpeculation. The power of certain ſounds not only over the human ſpecies, but even over the inanimate creation, is indeed very ſurpriſing. It is well known, that the moſt ſolid walls, nay the ground itſelf, will be found to ſhake at ſome particular notes in muſic. This ſtrongly indicates the preſence of ſome univerſally diffuſed and exceedingly elaſtic fluid, which is thrown into vibrations by the concuſſions of the atmoſphere upon it, produced by the motion of the ſounding body.—If theſe concuſſions are ſo ſtrong as to make the large quantity of elaſtic fluid vibrate that is diſperſed through a ſtone wall, or a conſiderable portion of earth, it is no wonder they ſhould have the ſame effect upon that inviſible and exceedingly ſubtile matter that pervades and ſeems to reſide in our nerves. The conſequence in both caſes is preciſely the ſame: the inanimate bodies tremulate, i. e. *dance*, to the ſound of the inſtrument; and the perſon who hears the ſounds, has an inclination to move his limbs in proportion to the meaſure or ſucceſſion of the muſical notes.

It would ſeem, therefore, that the origin of dancing lies entirely in the mechaniſm of the nerves of the body.—Some there are that have their nerves conſtructed in ſuch a manner, that they cannot be affected by the ſounds which affect others, and ſome ſcarce with any; while others have ſuch an irritability of the nerves in this caſe, that they cannot, without the greateſt difficulty, ſit or ſtand ſtill when they hear a favourite piece of muſic played.

It is conjectured, with a great degree of probability, by very eminent philoſophers, that all the ſenſations and paſſions to which we are ſubject, do immediately depend upon the vibrations excited in the nervous fluid above-mentioned. Hence, muſical ſounds have the greateſt power over thoſe people who are of a delicate, ſenſible frame, and who have ſtrong paſſions. If it is true, therefore, which is indeed conjectured with a great deal of probability, that every paſſion in the human nature immediately depends upon a certain affection of the nervous ſyſtem, or a certain motion or vibration in the nervous fluid, we ſhall immediately ſee the origin of the different dances among different nations. One kind of vibration, for inſtance, raiſes the paſſions of anger, pride, &c. which are indiſpenſably neceſſary in warlike nations. The ſounds, for ſuch there are, capable of exciting a ſimilar vibration, would naturally conſtitute the martial muſic among ſuch nations, and dances conformable to it would be inſtituted. This appears to be the caſe particularly among barbarous nations, as we ſhall preſently have occaſion to remark. Other vibrations of the nervous fluid produce the paſſions of joy, love, &c. and ſounds capable of exciting theſe particular vibrations will immediately be formed into muſic for dances of another kind.

As barbarous people are obſerved to have the ſtrongeſt paſſions, ſo they are alſo obſerved to be the moſt eaſily affected by ſounds, and the moſt addicted to dancing. Sounds to us the moſt diſagreeable, the drumming with ſticks upon an empty caſk, or the noiſe made by blowing into reeds incapable of yielding one muſical note tolerable to us, is agreeable muſic to them. Much more are they affected by the ſound of inſtruments which have any thing agreeable in them. Mr Gallini informs us, that "The ſpirit of dancing prevails almoſt beyond imagination among both men and women in moſt parts of Africa. It is even more than inſtinct, it is a rage, in ſome countries of that part of the globe.—Upon the Gold Coaſt eſpecially, the inhabitants are ſo paſſionately fond of it, that in the midſt of their hardeſt labour, if they hear a perſon ſing, or any muſical inſtrument played, they cannot refrain from dancing.—There are even well atteſted ſtories of ſome Negroes flinging themſelves at the feet of an European playing on a fiddle, intreating him to deſiſt, unleſs he had a mind to tire them to death; it being impoſſible for them to ceaſe dancing while he continued playing." —The ſame thing is found to take place in America, though, as the inhabitants of that continent are found to be of a more fierce and barbarous nature than the African nations, their dances are ſtill more uncouth and barbarous than thoſe of the Negroes. "In Mexico, ſays Gallini, they have alſo their dances and muſic, but in the moſt uncouth and barbarous ſtyle. For their ſymphony they have wooden drums, ſomething in form of a kettle-drum, with a kind of pipe or flagellet, made of a hollow cane or reed, but very grating to an European ear. It is obſerved they love every thing that makes a noiſe, how diſagreeable ſoever the ſound is. They will alſo hum over ſomething like a tune when they dance 30 or 40 in a circle, ſtretching out their hands, and laying them on each others ſhoulders. They ſtamp and jump, and uſe the moſt antic geſtures for ſeveral hours, till they are heartily weary. And one or two of the company ſometimes ſtep out of the ring to make ſport for the reſt, by ſhowing feats of activity, throwing their lances up into the air, catching them again, bending backwards, and ſpringing forwards with great agility."

The origin of dancing among the Greeks was moſt certainly the ſame as among all other nations; but as they proceeded a certain length in civilization, their dances were of conſequence more regular and agreeable than thoſe of the more barbarous nations. They reduced dancing into a kind of regular ſyſtem; and had dances proper for exciting, by means of the ſympathy above-mentioned, any paſſion whatever in the minds of the beholders. In this way they are ſaid to have proceeded very great lengths, to us abſolutely incredible. At Athens, it is ſaid, that the dance of the Eumenides or Furies on the theatre, had ſo expreſſive a character as to ſtrike the ſpectators with irreſiſtible terror: men grown old in the profeſſion of arms trembled; the multitude ran out; women with child miſcarried; people imagined they ſaw in earneſt thoſe terrible deities commiſſioned with the vengeance of heaven to purſue and puniſh crimes upon earth.

To produce ſuch effects as theſe would now be utterly impoſſible. For this reaſon it is, that many look upon the art of dancing as loſt; and that the ancient dancers were poſſeſſed of ſome peculiar ſkill in executing theſe geſtures that raiſe the paſſions, which are to us unknown. It ſeems rather probable, however, that the paſſions of mankind are now more under the dominion of reaſon, or ſome other principle, which keeps them from appearing with ſuch violence as formerly. Hence it might very readily happen, that though theſe celebrated dancers, or others equally ſkilful, were to appear on modern theatres, they might be treated with contempt and deriſion. It is certain, that the ancients fell far ſhort of the civilization of the modern Europeans, inſomuch, that they may very well be called barbarians and ſavages, in compariſon of them. The art of dancing, therefore, is not loſt, but only become different from what it was; and unleſs people were to live in a different manner from what they now do, it is utterly impoſſible to expect the ſame effects from any kind of geſtures whatever.

It is remarkable, however, that though the Greeks were ſo extravagantly fond of dancing, that it entered into their polity both civil and religious, it was quite otherwiſe with the Romans. As long as the republic laſted, dancing was accounted diſhonourable; inſomuch that Cicero reproaches Gabinius, a conſular man, with having *danced*. It was introduced indeed under the Emperor Auguſtus, but the dancers were baniſhed by Tiberius; and ſeveral ſenators were expelled by Domitian, becauſe they had *danced*. The Greeks had martial dances, which they reckoned to be very uſeful for keeping up the warlike ſpirit of their youth; but the Romans, though equally warlike with the Greeks, never had any thing of the kind.—This probably may be owing to the want of that romantic turn for which the Greeks were ſo remarkable. The Romans had no heroes among them ſuch as Hercules, Achilles, or Ajax; nor does the whole Roman hiſtory furniſh an example of a general that made war after the manner of Alexander the Great. Though their ſoldiers were as valiant as ever the Greeks could pretend to be, the object with them was the honour of the republic, and not their own perſonal praiſe. Hence there was leſs fury, and much more cool deliberate valour, exerciſed by the Romans, than any other nation whatever. The paſſions of pride, reſentment, obſtinacy, &c. were excited in them, not by the mechanical means of muſic and dancing, but by being taught that it was their chief honour to fight for the republic.—It does not however appear, that the Romans were at all leſs capable of being affected in this mechanical manner than the Greeks. When dancing was once introduced, it had the very ſame effects at Rome as at Athens.

Among the Jews, dancing ſeems to have made a part of the religious worſhip on ſome occaſions, as we learn from ſome paſſages in the Pſalms, though we do not find either that or ſinging poſitively enjoined as a divine precept.—In the Chriſtian churches mentioned in the New Teſtament, there is no account of dancing being introduced as an act of worſhip, though it is certain that it was uſed as ſuch in after ages. Mr Gallini tells us, that "at *Limoges*, not long ago, the people uſed to dance the round in the choir of the church which is under the invocation of their patron ſaint, and at the end of each pſalm, inſtead of the *Gloria Patri*, they ſung as follows: *St Marcel, pray for us, and we will dance in honour of you.*"—Though dancing would now be looked upon as the higheſt degree of profanation in a religious aſſembly, yet it is certain, that dancing, conſidered as an expreſſion of joy, is no more a profanation than ſinging, or than ſimple ſpeaking; nor can it be thought in the leaſt more abſurd, that a Chriſtian ſhould *dance* for joy that Jeſus Chriſt is riſen from the dead, than that David danced before the ark when it was returned to him after a long abſence.

Plato reduces the dances of the ancients to three claſſes. 1. The military dances, which tended to make the body robuſt, active, and well-diſpoſed for all the exerciſes of war. 2. The domeſtic dances, which had for their object an agreeable and innocent relaxation and amuſement. 3. The mediatorial dances, which were in uſe in expiations and ſacrifices.—Of military dances there were two ſorts: the *gymnopedique* dance, or the dance of children; and the *enoplian*, or armed dance. The Spartans had invented the firſt for an early excitation of the courage of their children, and to lead them on inſenſibly to the exerciſe of the armed dance. This childrens dance uſed to be executed in the public place. It was compoſed of two choirs; the one of grown men, the other of children; whence, being chiefly deſigned for the latter, it took its name. They were both of them in a ſtate of nudity. The choir of the children regulated their motions by thoſe of the men, and all danced at the ſame time, ſinging the poems of Thales, Alcman, and Dionyſodotus.—The *enoplian* or *pyrrhic* was danced by young men armed cap-a-pee, who executed, to the ſound of the flute, all the proper movements either for attack or for defence. It was compoſed of four parts.—The firſt, the *podiſm* or footing; which conſiſted in a quick ſhifting motion of the feet, ſuch as was neceſſary for overtaking a flying enemy, or for getting away from him when an overmatch.—The ſecond part was the *xiphiſm*: this was a kind of mock-fight, in which the dancers imitated all the motions of combatants; aiming a ſtroke, darting a javelin, or dextrouſly dodging, parrying, or avoiding a blow or thruſt. The third part, called the *komos*, conſiſted in very high leaps or vaultings, which the dancers frequently repeated, for the better uſing themſelves occaſionally to leap over a ditch, or ſpring over a wall. The *tetracomos* was the fourth and laſt part: this was a ſquare figure, executed by ſlow and majeſtic movements; but it is uncertain whether this was every where executed in the ſame manner.

Of all the Greeks, the Spartans were thoſe who moſt cultivated the Pyrrhic dance. Athenæus relates, that they had a law by which they were obliged to exerciſe their children at it from the age of five years. This warlike people conſtantly retained the cuſtom of accompanying their dances with hymns and ſongs. The following was ſung for the dance called *trichoria*, ſaid to be inſtituted by Lycurgus, and which had its name from its being compoſed of three choirs, one of children, another of young men, and the third of old The old men opened the dance, ſaying, "In time paſt we were valiant." The young men anſwered, "We are ſo at preſent."—"We ſhall be ſtill more ſo, when our time comes," replied the chorus of children. The Spartans never danced but with real arms. In proceſs of time, however, other nations came to uſe only weapons of wood on ſuch occaſions. Nay, it was only ſo late as the days of Athenæus, who lived in the ſecond century, that the dancers of the Pyrrhic, inſtead of arms, carried only flaſks, ivy-bound wands, (thyrſus), or reeds. But, even in Ariſtotle's days, they had begun to uſe thyrſuſes inſtead of pikes, and lighted torches in lieu of javelins and ſwords. With theſe torches, they executed a dance called the *conflagration of the world*.

Of the dances for amuſement and recreation, ſome were but ſimply gambols, or ſportive exerciſes, which had no character of imitation, and of which the greater part exiſt to this day. The others were more complex, more agreeable, figured, and were always accompanied with ſinging. Among the firſt or ſimple ones was the *aſcoliaſmus*; which conſiſted in jumping, with one foot only, on bladders filled with air or with wine, and rubbed on the outſide with oil. The *dypodium* was jumped with both feet cloſe. The *kybeſteſis* was what is called in this country the *ſomerſet*.—Of the ſecond kind was that called the *wine-preſs*, of which there is a deſcription in Longinus, and the Ionian dances: theſe laſt, in the original of their inſtitution, had nothing but what was decent and modeſt; but, in time, their movements came to be ſo depraved, as to be employed in expreſſing nothing but voluptuouſneſs, and even the groſſeſt obſcenity.

Among the ancients there were no feſtivals nor religious aſſemblies but what were accompanied with ſongs and dances. It was not held poſſible to celebrate any myſtery, or to be initiated, without the intervention of theſe two arts. In ſhort, they were looked upon to be ſo eſſential in theſe kinds of ceremonies, that to expreſs the crime of ſuch as were guilty of revealing the ſacred myſteries, they employed the word *kheiſtæ*, "to be out of the dance."—The moſt ancient of theſe religious dances is the *Bacchic;* which was not only conſecrated to Bacchus, but to all the deities whoſe feſtival was celebrated with a kind of enthuſiaſm.—The moſt grave and majeſtic was the *hyporchematic:* it was executed to the lyre, and accompanied with the voice.—At his return from Crete, Theſeus inſtituted a dance at which he himſelf aſſiſted at the head of a numerous and ſplendid band of youth round the altar of Apollo. The dance was compoſed of three parts; the *ſtrophe*, the *antiſtrophe*, and the *ſtationary*.—In the ſtrophe, the movements were from the right to the left; in the antiſtrophe, from the left to the right. In the ſtationary, they danced before the altar; ſo that the ſtationary did not mean an abſolute pauſe or reſt, but only a more ſlow or grave movement.—Plutarch is perſuaded, that in this dance there is a profound myſtery: he thinks, that by the *ſtrophe* is indicated the motion of the world from eaſt to weſt; by the *antiſtrophe*, the motion of the planets from the weſt to the eaſt; and by the *ſtationary*, the ſtability of the earth: To this dance Theſeus gave the name of *geranos*, or the crane; becauſe the figures which characteriſed it bore a reſemblance to thoſe deſcribed by cranes in their flight.

With regard to the modern practice of dancing as an art, there are few directions that can be of much ſervice. The following is extracted from Mr Gallini's deſcription of the ſeveral ſteps or movements.

"The dancing (ſays he) is generally on a theatre, or in a ſaloon or room.—At the theatre there are four parts to be conſidered. 1. The neareſt front to the ſpectators. 2, and 3. The two ſides or wings. 4. The furtheſt front from the ſpectators.

"In a ſaloon or room, the place in which are the ſpectators decides the appellation reſpectively to them of right and left. The dancer ſhould place himſelf in as advantageous ~~a point~~ of view to them as poſſible.

"In the dance itſelf, there are to be diſtinguiſhed, the attitude of the body, the figure, the poſitions, the bends, the raiſings or leaps, the ſteps, the cabriol, the fallings, the ſlides, the turns of the body; the cadences.

"The *attitude* of the body requires the preſenting one's ſelf in the moſt graceful manner to the company.

"The *figure* is to follow the track preſcribed to the ſteps in the dance.

"The *poſition* is that of the varied attitudes, which muſt be at once ſtriking and eaſy, as alſo of the different exertions of the legs and feet in dancing.

"The *bends* are inflexions of the knees, of the body, of the head, or the arms.

"The *raiſings* are the contraſt to the bends, the extenſion of the knee. One of theſe two motions neceſſarily precedes the other.

"The *ſtep* is the motion by the foot or feet from one place to another.

"The *leap* is executed by ſpringing up into the air; it begins with a bend, and proceeds with a quick extenſion of the legs, ſo that both feet quit the ground.

"The *cabriole* is the croſſing, or cutting of capers, during the leap, before the return of the feet to the ground.

"The *falling* is the return of the feet to the ground, by the natural gravitation of the body.

"The *ſlide* is the action of moving the foot along the ground without quitting it.

"The *turn* is the motion of the body towards either ſide, or quite round.

"The *cadence* is the knowledge of the different meaſures, and of the times of movement the moſt marked in the muſic.

"The *track* is the line marked by the dance: it may be either ſtraight or curve, and is ſuſceptible of all the inflexions correſpondent to the various deſigns of the compoſer.—There are the right, the diametral line, the circular line, and the oblique line. The *right* line is that which goes lengthways, reckoning from one end of the room towards the other. The *diametral* line is acroſs the room, from one ſide to the other. The *circular* line is waving, or undulatory, from one place to another. The *oblique* line proceeds obliquely from one quarter of the room towards another.—Each of theſe lines may directly or ſeparately form the dancer's track, diverſified with ſteps and poſitions.

"The *regular* figure is when two or more dancers move in contrary directions; that is to ſay, that when one moves towards the right, the other moves to the left.—The *irregular* line is when the couples figuring together are both on the ſame ſide.

"Commonly the man gives the right-hand to the lady in the beginning or ending of the dance, as we ſee in the *minuet*, *louvre*, &c.

"When a greater number of dancers figure together, they are to execute the figure agreeably to the compoſition of the dance, with ſpecial attention to keep an eye conſtantly on the partner.—When, in any given dance, the dancers have danced for ſome time in the ſame place, the *track* is only to be conſidered as the conductor of the *ſteps*, but not of the *figure;* but when the dance continues, without being confined to the ſame place, then the *track* muſt be conſidered as the conductor both of the ſteps and of the figure.

"Now, to obſerve the figure, the dancer muſt have placed himſelf at the beginning of the track upon which he is to dance, and comprehend the figure before he himſelf begins it. He is to remark and conceive whether the figure is right, diametral, circular, or oblique; if it is progreſſive or retrogreſſive, or towards the right or left. He ſhould have the air played or ſung to him, to underſtand the movement.—Where the tracks croſs one another, the ſteps of each of the couples muſt leave a ſufficient diſtance between them not to confuſe the figure.

"There are commonly reckoned ten kinds of poſitions, which are divided into *true* and *falſe*, five each.—There are three principal parts of the foot to be obſerved; the toes, the heel, and the ancle.

"The true poſitions are when the two feet are in a certain uniform regularity, the toes turned equally outwards.—The falſe are divided into regular and irregular. They differ from the true, in that the toes are either both turned inwards; or if the toes of one foot are turned outwards, the others are turned inward.

"In the firſt of the true poſitions, the heels of the two feet are cloſe together, ſo that they touch; the toes being turned out. In the ſecond the two feet are open, in the ſame line, ſo that the diſtance between the two heels is preciſely the length of one foot. In the third the heel of one foot is brought to the ancle of the other, or ſeems to lock in with it. In the fourth, the two feet are the one before the other, a foot's length diſtance between the two heels, which are on the ſame line. In the fifth, the two feet are acroſs, the one before the other; ſo that the heel of one foot is directly oppoſite to the toes of the other.

“ In the firſt of the falſe poſitions, the toes of both feet are turned inwards, ſo that they touch, the heels being open. The ſecond is, when the feet are aſunder at a foot's diſtance between the toes of each, which are turned inward, the heels being on a line. The third is, when the toes of one foot are turned outwards, the other inwards, ſo that the two feet form a parallel. The fourth is, when the toes of the two feet are turned inwards; but the toes of one foot are brought nearer the ancle of the other. The fifth is, when the toes of the two feet are turned inwards, but the heel of one foot is oppoſite to the toes of the other.

“ There are mixed poſitions, compoſed of the true and falſe in combination; which admit of ſuch an infinite variety, and are in their nature ſo unſuſceptible of deſcription by words, that it is only the ſight of the performance that can give any tolerable idea of them.

“ Of the bends of the knee there are two kinds; the one *ſimple*, the other *forced*. The ſimple bend is an inflexion of the knees without moving the heel, and is executed with the foot flat to the ground. The forced bend is made on the toes with more force and lower.

“ Much is to be obſerved on the head of *ſteps*. Firſt, not to make any movement before having put the body in an upright poſture, firm on the haunches.

“ Begin with the inflexion of the knee and thigh; advance one leg foremoſt; with the whole foot on the ground, laying the ſtreſs of the body on the advanced leg.

“ There are ſome who begin the ſtep by the point of the toes; but that has an air of theatrical affectation. Nothing can be more noble than a graceful eaſe and dignity of ſtep. The quantity of ſteps uſed in dancing are almoſt innumerable; they are nevertheleſs reducible under five denominations, which may ſerve well enough to give a general idea of the different movements that may be made by the leg, *viz.* the direct ſtep, the open ſtep, the circular ſtep, the twiſted ſtep, and the cut ſtep.

“ The *direct* ſtep is when the foot goes upon a right line, either forwards or backwards.

The *open* ſtep is when the legs open. Of this ſtep there are three kinds: one when they open outwards: another, when, deſcribing a kind of circle, they form an in-knee'd figure: a third, when they open ſideways; this is a ſort of right ſtep, becauſe the figure is in a right line.

“ The *round* ſtep, is when the foot, in its motion, makes a circular figure, either inwards or outwards.

“ The *twiſted* ſtep, or pas *tortille*, is when the foot in its motion turns in and out. There are three kinds of this ſtep; one forwards, another backwards, the third ſidelong.

“ The *cut* ſtep is when one leg or foot comes to ſtrike againſt the other. There are alſo three ſorts of this ſtep; backwards, forwards, and ſidelong.

“ The ſteps may be accompanied with bendings, riſings, leaps, cabrioles, fallings, ſlidings, the foot in the air, the tip-toe, the reſt on the heel, quarter-turns, half-turns, three-quarter turns, and whole-turns.

“ There may be practiſed three kinds of bends, or ſinkings, in the ſteps; *viz.* bending before the ſtep proceeds, in the act of ſtepping, and at the laſt of the ſteps.

“ The beginning or initial ſink-pace is at the firſt ſetting off, on advancing the leg.

“ The bend in the act of ſtepping continues the march or walk.

“ The final ſink-pace cloſes the march.

“ The riſing is juſt the reverſe of the bend, or ſink-pace, which ſhall have preceded it.

“ Some great maſters in the art of dancing, having obſerved that muſic, which is inſeparable from it, was capable of being preſerved and conveyed by the muſical characters, imagined by analogy, that the like advantage could be procured to the compoſition of dances. Upon this plan they attempted what is called the *chorography*, an art which they ſuppoſe was either utterly unknown to the ancients, or not tranſmitted to us from them.

“ It may indeed be eaſily allowed, that the track or figure of a dance may be determined by written or engraved lines; but thoſe lines will neceſſarily appear ſo perplexing, ſo intricate, ſo difficult, if not impoſſible to ſeize, in their various relations, that they are only fit to diſguſt and diſcourage, without the poſſibility of their conveying a ſatisfactory or retainable inſtruction. —Thence it is, that the article of *Chorography* in the French *Encyclopédie* is univerſally exploded as unintelligible and uſeleſs: though nothing more than an elementary indication of the art; and an explanation, ſuch as it is, of ſome of the technical terms of it.”

Rope-DANCER, *ſchœnobates*, a perſon who walks, leaps, dances, and performs ſeveral other feats, upon a ſmall rope or wire.

The ancients had their rope-dancers as well as we. Theſe had four ſeveral ways of exerciſing their art: The firſt vaulted, or turned round the rope like a wheel round its axis, and there hung by the heels or neck. The ſecond flew or ſlid from above, reſting on their ſtomach, with the arms and legs extended. The third ran along a rope ſtretched in a right line or up and down. Laſtly, the fourth not only walked on the rope, but made ſurpriſing leaps and turns thereon. They had likewiſe the *cremnobates*, and *orobates*; that is, people who walked on the brinks of precipices: Nay more, Suetonius *in Galba*, *c.* 6. Seneca in his 85th Epiſtle, and Pliny, *lib.* viii. *c.* 2. make mention of elephants that were taught to walk on the rope.

St Vitus's DANCE. See (the *Index* ſubjoided to) MEDICINE.

DANCETTE, in heraldry, is when the outline of any bordure, or ordinary, is indented very largely, the largeneſs of the indentures being the only thing that diſtinguiſhes it from indented.

DANDELION, in botany. See LEONTODON.

DANEGELT, an annual tax laid on the Anglo-Saxons, firſt of 1 *s.* afterwards 2 *s.* fot every hide of land thro' the realm, for maintaining ſuch a number of forces as were thought ſufficient to clear the Britiſh ſeas of Daniſh pyrates, which heretofore greatly annoyed our coaſts.

Danegelt was firſt impoſed as a ſtanding yearly tax on the whole nation, under king Ethelred, A. D, 991. That prince, ſays Cambden, *Britan.* 142. much diſtreſſed by the continual invaſions of the Danes; to procure his peace, was compelled to charge his people with heavy taxes, called *danegelt*.—At firſt he paid 10,000 *l.* then 16,000 *l.* then 24,000 *l.* after that 36,000 *l.* and laſtly, 48,000 *l.*

Edward the Confeſſor remitted this tax: William I. and II. reaſſumed it occaſionally. In the reign of Henry I. it was accounted among the king's ſtanding revenues; but king Stephen, on his coronation-day, abrogated it for ever.

No church or church-land paid a penny to the *dangelt*; becauſe, as is ſet forth in an ancient Saxon law, the people of England placed more confidence in the prayers of the church than in any military defence they could make.

DANDOLO (Henry), doge of Venice, a brave admiral and politician. With a Venetian fleet he took Conſtantinople in 1203, and had the moderation to refuſe to be emperor. He died in 1250.

DANET (Peter), abbot of St Nicholas de Verdun, was one of the perſons choſen by the duke of Montauſier to write on the claſſics for the uſe of the dauphin. He had a ſhare in Phædrus, which he publiſhed with notes and explications in Latin. He alſo wrote a dictionary in Latin and French, and another in French and Latin. He died at Paris in 1709.

DANIEL, the fourth of the greater prophets, was born in Judea of the tribe of Judah, about the 25th year of the reign of Joſiah. He was led captive to Babylon, with other young Hebrew lords, after the taking of Jeruſalem by Nebuchadnezzar, who took them into his ſervice. That prince gave them maſters to inſtruct them in the language and ſciences of the Chaldæans, and ordered them to be fed with the moſt delicate viands; but they, fearing that they ſhould eat meat forbidden by the law of Moſes, deſired the king's officers to allow them only pulſe. The wiſdom and conduct of Daniel pleaſing Nebuchadnezzar, that prince gave him ſeveral poſts of honour. It is commonly believed, that this prophet, when but 12 years of age, made known the innocence of the chaſte Suſannah; but the learned are not agreed, that the young Daniel, who confounded the old men, was the ſame with this prophet. However, he explained Nebuchadnezzar's dream of the myſterious ſtatue, which foretold the four great monarchies; on which account he was made prefect of the province of Babylon. In the reign of Darius the king of the Medes, he refuſed to adore the golden ſtatue of the king, and was caſt into the lions den, when thoſe beaſts, tho' pinched with hunger, did him no manner of hurt. And he explained the characters written on the wall of the room where Belſhazzar was feaſting.

It is believed that Daniel died in Chaldæa, and that he did not take advantage of the permiſſion granted by Cyrus to the Jews of returning to their own country. St Epiphanius ſays he died at Babylon; and herein he is followed by the generality of hiſtorians The firſt ſix chapters of the book of Daniel are an hiſtory of the kings of Babylon, and what befel the captive Jews under their government. In the ſix laſt he is altogether prophetical, foretelling not only what ſhould happen to his own church and nation, but events in which foreign princes were concerned; particularly the riſe and downfal of the four ſecular monarchies of the world, and the eſtabliſhment of the fifth, or ſpiritual kingdom of the Meſſiah. "Amongſt the old prophets (ſays the great Sir Iſaac Newton), Daniel is the moſt diſtinct in the order of time, and eaſieſt to be underſtood; and therefore, in thoſe things which relate to the laſt times, he muſt be made key to the reſt.—His prophecies are all of them related to one another, as if they were but ſeveral parts of one general prophecy. The firſt is the eaſieſt to be underſtood, and every following prophecy adds ſomething to the former."

Daniel (Samuel), an eminent poet and hiſtorian, was born near Taunton in Somerſetſhire in the year 1562, and educated at Oxford: but leaving that univerſity without a degree, he applied himſelf to Engliſh hiſtory and poetry under the patronage of the earl of Pembroke's family. He was afterwards tutor to the lady Ann Clifford; and, upon the death of Spencer, was created poet-laureat to queen Elizabeth. In king James's reign he was appointed gentleman extraordinary, and afterwards one of the grooms of the privy-chamber, to the queen conſort, who took great delight in his converſation and writings. He wrote an hiſtory of England, ſeveral dramatic pieces, and ſome poems; and died in 1619.

Daniel (Gabriel), a celebrated Jeſuit, and one of the beſt French hiſtorians, was born at Rouen in 1649. He taught polite literature, philoſophy, and divinity, among the Jeſuits; and was ſuperior of their houſe at Paris, where he died in 1728. There are a great number of his works publiſhed in French, of which the principal are, 1. An Hiſtory of France, of which he alſo wrote an abridgment in nine volumes 12mo. 2. An hiſtory of the French Militia, in 2 vols 4to. 3. An anſwer to the Provincial Letters. 4. A voyage to the World of Deſcartes. 5. Letters on the doctrines of the Theoriſts, and on Probability. 6. New difficulties relating to the knowledge of Brutes; and, 7. A theological treatiſe on the Efficacy of Grace.

DANTE (Aligheri), one of the firſt poets of Italy, born at Florence in 1265, of a good family. He conſecrated the firſt of his muſe to love; but afterwards he undertook a more ſerious work. He would have been more happy if he had never meddled with any thing elſe: for being ambitious, and having attained ſome of the moſt conſiderable poſts of the common wealth, he was cruſhed by the ruins of the faction he had embraced. Pope Boniface VIII. ſent Charles of Valois thither in 1301, to re-eſtabliſh the peace; Florence being divided into two factions, one named the *white*, and the other the *black*. No better way was found to pacify the city than to expel thence the faction of the white, which Dante favoured. He endeavoured to revenge himſelf at the expence of his country, and did all he could to expoſe it to a bloody war. He died in exile in 1321. He applied himſelf diligently to ſtudy during his baniſhment; and wrote ſome books wherein he ſhowed more fire and ſpirit than he would have done had he enjoyed a more quiet ſtate of life. The moſt conſiderable of his works is the poem entitled "The Comedy of Hell, Purgatory, and Paradiſe." It has much diſpleaſed the church of Rome; as did likewiſe another book of his entitled,

“ De Monarchia;” wherein he maintains, that the authority of the emperors ought not to depend on that of the Popes.

Dante (John Baptiſt), a native of Perugia, an excellent mathematician, called the *new Dædalus*, for the wings he made himſelf, and with which he flew ſeveral times over the lake Thraſymenus. He fell in one of his enterpriſes; the iron work with which he managed one of his wings having failed; by which accident he broke his thigh: but it was ſet by the ſurgeons, and he was afterwards called to Venice to profeſs mathematics.

DANTZIC, the metropolis of the palatinate of Pomeralla in Poland, ſtanding on a branch of the Viſtula, about four miles above where it falls into the Baltic; in E. Long. 18. 36. N. Lat. 54. 20. It is large, populous, and rich; and carries on a vaſt trade, being the chief mart and magazine of Poland, and one of the greateſt granaries in the world; ſo that whole fleets of ſhips come hither every year to load with corn alone. It conſiſts of the Old and New town, with their ſuburbs, has a fine harbour, a great number of ſhips, and had many valuable privileges. Among the laſt were thoſe of coining money, gathering amber, and ſending repreſentatives to the general diets of Poland and the Pruſſian ſenate. It is well fortified; but, being commanded by two hills on the ſouth ſide, cannot ſuſtain a long ſiege. It is computed that 365,000 laſts of Poliſh wheat are ſhipped from this place, one year with another. Hither Poland ſends its commodities for exportation, and from hence is chiefly ſupplied with thoſe of other countries. Among the latter are great quantities of herrings, both Scotch and Dutch. The exports and imports conſiſt of a variety of articles, and furniſh a vaſt deal of buſineſs and wealth to the city. The inhabitants, who are computed at 200,000, are moſtly Lutherans, with a mixture of Calviniſts and Papiſts. A conſtant garriſon of 200 ſoldiersis kept in the city. One of the ſuburbs is called *Scotland;* and the Scots have great privileges in conſequence of their gallant defence of the town, under one of the family of Douglas, when it was beſieged by the Poles. It is ſaid there are upwards of 30,000 pedlars of that nation in Poland, who travel on foot, and ſome with three, four, or five horſes. In king Charles II.'s time they were about 53,000: in that reign Sir John Denham and Mr Killigrew were ſent to take the number of them, and to tax them by the poll, with the king of Poland's licence; which having obtained, they brought home L. 10,000 Sterling, beſides their charges in the journey. Here is a Lutheran college with ſeven profeſſors, and one teacher of the Poliſh language. At the mouth of the Viſtula, which is defended by ſeveral forts, is a good harbour belonging to Dantzic. Its territory conſiſts moſtly of iſlands formed by the Viſtula and Motlau.—It is hardly credible how this city has changed its maſters in competition for the crown of Poland, and what ſums have been extorted from it. While the kingdom of Poland remained, Dantzic was under its protection, but governed by its own magiſtrates in the form of a republic; but ſince the deſtruction of that kingdom, the city of Dantzic has been greatly oppreſſed by the king of Pruſſia.

DANUBE, the largeſt and moſt conſiderable river in Europe, riſing in the Black Foreſt, near Zunberg; and running N. E. through Swabia by Ulm, the capital of that country; then running E. through Baſſaria and Auſtria, paſſes by Ratiſbon, Paſſau, Ens, and Vienna. It then enters Hungary, and runs S. E. from Preſburg to Buda, and ſo on to Belgrade; after which it divides Bulgaria from Molachia and Moldavia, diſcharging itſelf by ſeveral channels into the Black Sea, in the province of Beſſarabia. Towards the mouth, it was called the *Iſter* by the ancients; and it is now ſaid, that four of the mouths are choaked up with ſand, and that there are only two remaining. It begins to be navigable for boats at Ulm, and receives ſeveral large rivers as it paſſes along. It is ſo deep between Buda and Belgrade, that the Turks and Chriſtians have had men of war upon it; and yet it is not navigable to the Black Sea, on account of the cataracts.

DAPHNE, in fabulous hiſtory, the daughter of the river Peneus, was at her own deſire turned into a laurel by her father, to avoid the amours of Apollo.

Daphne, *Spurge-laurel;* a genus of the monogynia order, belonging to the octandria claſs of plants. There are 11 ſpecies, of which the two following are the moſt remarkable. 1. The laureola, or common ſpurge laurel, is a native of the woods in many parts of England. It is a low evergreen ſhrub, riſing with ſeveral ſtalks from the root to the height of three feet, garniſhed with thick ſpear-ſhaped leaves ſitting cloſe to the branches, of a lucid green colour. Between theſe to the upper part of the ſtalks, come out the flowers in ſmall cluſters, of a yellowiſh green colour, and appear ſoon after Chriſtmas, if the ſeaſon is not remarkably ſevere. The leaves continue green all the year, which renders the plants very ornamental; and as they will thrive under tall trees, they are therefore proper to fill up the ſpaces of plantations. 2. The mezereon, or ſpurge-olive, is a native of England, Germany, *&c.* and is a very ornamental ſhrub in gardens. It riſes to the height of five or ſix feet, with a ſtrong woody ſtalk, putting forth many woody branches, ſo as to form a regular head. The flowers come out very early in the ſpring, before the leaves appear, growing in cluſters all round the ſhoots of the former year. There are commonly three flowers produced from each joint or knot, ſtanding on the ſame ſhort footſtalk, which have ſhort ſwelling tubes divided into four parts at the top, which ſpread open: they have a very fragrant odour; ſo that where there are plenty of the ſhrubs together, they perfume the air to a conſiderable diſtance around them. The flowers are of a white or peach-bloſſom colour. After the flowers are paſt, the leaves come out, which are ſpear-ſhaped, ſmooth, and placed without order. The flowers are ſucceeded by oval berries; thoſe of the white kind being yellow; and of the other, red. Both ſorts are eaſily propagated by ſeeds, which ſhould be ſown ſoon after they are ripe; for if not ſown till the next ſpring, they very often miſcarry.

Very happy effects have been found from the uſe of the firſt ſpecies in rheumatic fevers. It operates as a briſk and rather ſevere purgative. It is an efficacious medicines in worm caſes; but is dangerous in unſkilful hands, as being poſſeſſed of conſiderable acrimony. The whole plant hath the ſame qualities, but the bark of the root is the ſtrongeſt. Dr Alſton fixes the outſide doſe at ten grains.—An ointment prepared from the bark or the berries of mezereon root hath been ſucceſsfully applied to ill-conditioned ulcers. The whole plant is very corroſive. Six of the berries will kill a wolf. A woman gave 12 grains of the berries to her daughter, who had a quartan ague: ſhe vomited blood, and died immediately. A decoction made of two drams of the cortical part of the root, boiled in three pints of water till one pint is waſted; and this quantity drunk daily, is ſaid to be very efficacious in reſolving venereal nodes, and other indurations of the perioſteum. – The conſiderable and long-continued heat and irritation produced by this root in the throat when chewed, made Mr Withering think of giving it in a caſe of difficulty of ſwallowing, ſeemingly occaſioned by a paralytic affection. The patient was directed to chew a thin ſlice of the root as often as ſhe could bear it; and, in about two months, ſhe recovered her power of ſwallowing. She bore the diſagreeable irritation and ulcerations its acrimony occaſioned in her mouth with great reſolution: for ſhe was reduced to ſkin and bone, and for three years before had ſuffered extremely from hunger, without being able to ſatisfy her appetite; for ſhe ſwallowed liquids very imperfectly, and ſolids not at all: her complaint came on after lying in.—The plant is eaten by ſheep and goats, but refuſed by cows and horſes.

DAPIFER, the dignity or office of grand-maſter of a prince's houſehold. This title was given by the emperor of Conſtantinople to the Czar of Ruſſia, as a teſtimony of favour. In France the like officer was inſtituted by Charlemagne, under the title of *dapiferat;* and the dignity of dapifer is ſtill ſubſiſting in Germany, the elector of Bavaria aſſuming the title of *arch-dapifer of the empire*, whoſe office is, at the coronation of the emperor, to carry the firſt diſh of meat to table, on horſe-back.

DAPPLE-BAY, in the menage: When bay horſes have marks of a dark bay, they are called *dapple-bays*.

DAPPLE-*Black*: When a black horſe has got ſpots or marks more black or ſhining than the reſt of his ſkin, he is called a *dapple-black*.

DARAPTI, among logicians, one of the modes of ſyllogiſms of the third figure, whoſe premiſes are univerſal affirmatives, and the concluſion is a particular affirmative: thus,

DAR- Every body is diviſible;
AP- Every body is a ſubſtance;
TI, Therefore, ſome ſubſtance is diviſible.

DARDA, a town and fort of Lower Hungary, built by the Turks in 1686, and taken by the Imperialiſts the next year, in whoſe hands it remains. It is ſeated on the river Draw, 10 miles from its confluence with the Danube, and at the end of the bridge of Eſſeck. E. Long. 19. 10. N. Lat. 45. 45.

DARDANELLES, two ancient and ſtrong caſtles of Turky, one of which is in Romania, and the other in Natolia, on each ſide the canal formerly called the *Helleſpont*. This keeps up a communication with the Archipelago, and the Propontis or Sea of Marmora. The mouth of the canal is four miles and a half over; and the caſtles were built in 1659, to ſecure the Turkiſh fleet from the inſults of the Venetians. The ſhips that come from Conſtantinople are ſearched at the caſtle on the ſide of Natolia, to ſee what they have on board.

DARDANUS, ſon of Jupiter and Electra, founded the city and kingdom of Troy.

DARE, in ichthyology, the ſame with dace. See DACE.

DARIEN, or the Iſthmus of Panama, is a province between South and North America, being a narrow iſthmus, or neck of land, which joins them together. It is bounded on the north by the North Sea, on the ſouth by the South Sea, on the eaſt by the gulph or river of Darien, and on the weſt by another part of the South Sea and the province of Veragua. It lies in the form of a bow, or creſcent, about the great bay of Panama, in the South Sea; and is 300 miles in length, and 60 in breadth. This province is not the richeſt, but is of the greateſt importance to Spain, and has been the ſcene of more actions than any other in America. The wealth of Peru is brought hither, and from hence exported to Europe. This has induced many enterpriſing people to make attempts on Panama, Porto-Bello, and other towns of this province, in hopes of obtaining a rich booty.

The Scotch got poſſeſſion of part of this province in 1699, and had laid the foundations of a new town, deſigning to call it *New Edinburgh;* but, as the Engliſh were then in alliance with the Spaniards, king William would not permit them to go on. However, this country is not a very deſirable place to ſettle in, it being generally mountainous and barren, as well as exceſſive hot, and the lower grounds are liable to be ſuddenly overflowed in the rainy ſeaſon. Some of the mountains are ſo high, and of ſuch difficult acceſs, that it requires ſeveral days to paſs them. It was from theſe mountains the Spaniards firſt diſcovered the South Sea, or Pacific Ocean, in 1513.

DARII, in logic, one of the modes of ſyllogiſm of the firſt figure, wherein the major propoſition is an univerſal affirmative, and the minor and concluſion particular affirmatives: thus,

DA- Every thing that is moved, is moved by another;
RI- Some body is moved;
I. Therefore, ſome body is moved by another.

DARIUS, the name of ſeveral kings of Perſia. See (*Hiſtory* of) PERSIA.

DARKING, a market-town of Surrey in England, ſituated ten miles eaſt of Guilford. The market is noted for corn and proviſions, more eſpecially for fowls. W. Long. 8. 20. N. Lat. 51. 18.

DARLINGTON, a town of the county of Durham, ſituated in a flat on the river Skerne, which falls into the Tees. It is a pretty large place, has ſeveral ſtreets and a ſpacious market-place. W. Long. 1. 15. N. Lat. 54. 30.

DARMSTADT, a town of Germany in the circle of the Upper Rhine, and capital of the Landgraviate of Heſſe-Darmſtadt, with a handſome caſtle, where its own prince generally reſides. It is ſeated on a river of the ſame name in E. Long. 8. 40. N. Lat. 49. 50.

DARNEL, in botany. See LOLIUM.

DARNLEY (Lord). See (*Hiſtory* of) SCOTLAND.

DARTFORD, a town of the county of Kent in England, ſeated on the river Darent not far from its influx into the Thames. E. Long. 0. 16. N. Lat. 51. 25.

DARTMOUTH, a ſea-port town of Devonſhire, ſeated on the river Dart, near its fall into the ſea. It is a well frequented and populous place, having a commodious harbour, and a conſiderable trade by ſea. The town is large and well built; but the ſtreets are narrow and bad, though all paved. It has the title of an earldom, and ſends two members to parliament. W. Long. 4. 0. N. Lat. 50. 25.

DARTOS, in anatomy, one of the coats which form the ſcrotum. It is called the *dartos muſcle;* but Dr Hunter ſays, that no ſuch muſcle can be found, and Albinus takes no notice of it in his tables.

DASYPUS, the ARMADILLO or *Tatou*, in zoology; a genus of quadrupeds, belonging to the order of bruta. The daſypus has neither foreteeth nor dog-teeth; it is covered with a hard bony ſhell, interſected with diſtinct moveable zones or belts: this ſhell covers the head, the neck, the back, the flanks, and extends even to the extremity of the tail; the only parts to which it does not extend, are the throat, the breaſt, and the belly, which are covered with a whitiſh ſkin of a coarſe grain, reſembling that of a hen after the feathers are pulled off. The ſhell does not conſiſt of one entire piece, like that of the tortoiſe; but is divided into ſeparate belts, connected to each other by membranes, which enable the animal to move it, and even to roll itſelf up like a hedge-hog. The number of theſe belts does not depend on the age of the animal, as ſome have imagined; but is uniformly the ſame at all times, and ſerves to diſtinguiſh the different ſpecies. All the ſpecies of this animal were originally natives of America: they were entirely unknown to the ancients; and modern travellers mention them as peculiar to Mexico, Braſil, and the ſouthern parts of America; though ſome indeed have confounded them with two ſpecies of manis, or ſhell-lizard, which are found in the Eaſt Indies: others report that they are natives of Africa, becauſe ſome of them have been tranſported from Braſil to the coaſt of Guinea, where a few have ſince been propagated: but they were never heard of in Europe, Aſia or Africa, till after the diſcovery of America.—They are all endowed with the faculty of extending and contracting their bodies, and of rolling themſelves up like a ball, but not into ſo complete a ſphere as the hedge-hog. They are very inoffenſive animals, excepting when they get into gardens, where they devour the melons, potatoes, and other roots. They walk quickly; but can hardly be ſaid to run or leap, ſo that they ſeldom eſcape the purſuit either of men or dogs. But nature has not left them altogether defenceleſs. They dig deep holes in the earth; and ſeldom go very far from their ſubterraneous habitations: upon any alarm, they immediately go into their holes; but, when at too great a diſtance, they require but a few moments to make one. The hunters can hardly catch them by the tail before they ſink their body in the ground; where they ſtick ſo cloſe, that the tail frequently comes away and leaves the body in the earth; which obliges the hunters, when they want to take them alive and immutilated, to dilate the ſides of the hole. When they are taken, and find that there is no reſource, they inſtantly roll themſelves up, and will not extend their bodies, unleſs they are held near a fire. When in deep holes, there is no other method of making them come out, but by forcing in ſmoke or water. They keep in their holes through the day, and ſeldom go abroad in queſt of ſubſiſtence but in the night. The hunters uſually chaſe them with ſmall dogs, which eaſily come up with them. When the dogs are near, the creatures inſtantly roll themſelves up, and in this condition the hunters carry them off. However, if they be near a precipice they often eſcape both the dogs and hunters: they roll themſelves up, and tumble down like a ball, without breaking their ſhell, or receiving any injury. The daſypus is a very fruitful animal: the female generally brings forth four young ones every month; which is the reaſon why the ſpecies are ſo numerous, notwithſtanding they are ſo much ſought after on account of the ſweetneſs of their fleſh. The Indians likewiſe make baſkets, boxes, *&c.* of the ſhells which cover their heads.

Linnæus enumerates ſix ſpecies of daſypus, principally diſtinguiſhed by the number of their moveable belts. See Plate LXXXVII. fig. 1.

DATA, among mathematicians, a term for ſuch things or quantities as are given or known, in order to find other things thereby that are unknown. Euclid uſes the word *data* (of which he hath a particular tract) for ſuch ſpaces, lines, and angles as are given in magnitude, or to which we can aſſign others equal.

From the primary uſe of the word *data* in mathematics, it has been tranſplanted into other arts; as philoſophy, medicine, &c. where it expreſſes any quantity, which, for the ſake of a preſent calculation, is taken for granted to be ſuch, without requiring an immediate proof for its certainty; called alſo the *given* quantity, number, or power. And hence alſo ſuch things as are known, from whence either in natural philoſophy, the animal mechaniſm, or the operation of medicines, we come to the knowledge of others unknown, are now frequently in phyſical writers called *data*.

DATE, an addition or appendage in writings, acts, inſtruments, letters, &c. expreſſing the day and month of the year when the act, or letter, was paſſed or ſigned; together with the place where the ſame was done. The word is formed from the Latin *datum* "given," the participle of *do* "I give."

DATE, the fruit of the phœnix or great palm-tree. This fruit is ſomewhat in the ſhape of an acorn. It is compoſed of a thin, light, and gloſſy membrane, ſomewhat pellucid and yellowiſh; which contains a fine, ſoft, and pulpy fruit, which is firm, ſweet, and ſomewhat vinous to the taſte, eſculent, and wholeſome; and within this is incloſed a ſolid, tough, and hard kernel, of a pale grey colour on the outſide, and finely marbled within like the nutmeg.—For medicinal uſe, dates are to be choſen large, full, freſh, yellow on the ſurface, ſoft and tender, not too much wrinkled; ſuch as have a vinous taſte, and do not rattle when ſhaken. They are produced in many parts of Europe, but never ripen perfectly there. The beſt are from Tunis: they are alſo very fine and good in Egypt, and in many parts of the eaſt. Thoſe of Spain and France look well; but are never perfectly ripe, and are very ſubject to decay. They are preſerved three different ways: ſome preſſed and dry; others preſſed more moderately,

derately, and again moiſtened with their own juice; and others not preſſed at all, but moiſtened with the juice of other dates, as they are packed up, which is done in baſkets or in ſkins. Thoſe preſerved in this laſt way are much the beſt. Dates have always been eſteemed moderately ſtrengthening and aſtringent.

DATI (Carlo), profeſſor of polite learning at Florence. His native country became very famous, as well on account of his works, as of the eulogies which have been beſtowed on him by learned men. The chief work to which Dati applied himſelf, was *Della Pittura Antica*, of which he publiſhed an eſſay in the year 1667. He died in 1675, much lamented, as well for his humanity and amiable manners, as for his parts and learning.

DATISI, in logic, a mode of ſyllogiſms in the third figure, wherein the major is an univerſal affirmative, and the minor and concluſion particular affirmative propoſitions. For example,

DA- All who ſerve God are kings;
TI- Some who ſerve God are poor;
SI Therefore, ſome who are poor are kings.

DATIVE, in grammar, the third caſe in the declenſion of nouns; expreſſing the ſtate or relation of a thing to whoſe profit or loſs ſome other thing is referred. See GRAMMAR.

It is called *dative*, becauſe uſually governed by a verb implying ſomething to be given to ſome perſon. As, *commodare Socrati*, "to lend to Socrates;" *utilis reipublicæ*, "uſeful to the commonwealth;" *pernicioſus eccleſiæ*, "pernicious to the church."

In Engliſh, where we have properly no caſes, this relation is expreſſed by the ſign *to*, or *for*.

DATURA, the THORN-APPLE; a genus of the monogynia order, belonging to the pentandria claſs of plants. There are ſix ſpecies. The ſtramonium, or common thorn-apple, riſes a yard high, with an erect, ſtrong, round, hollow, green ſtalk, branching luxuriantly, having the branches widely extended on every ſide; large, oval, irregularly-angulated, ſmooth, dark-green leaves; and from the diviſions of the branches, large white flowers ſingly, ſucceeded by large, oval, prickly capſules, growing erect, commonly called *thorn-apples*. At night the upper leaves riſe up and incloſe the flowers. The bloſſoms have ſometimes a tinge of purple or violet. The flowers conſiſt of one large, funnel-ſhaped petal, having a long tube, and ſpreading pentagonal limb, ſucceeded by large roundiſh capſules of the ſize of middling apples, cloſely beſet with ſharp ſpines. An ointment prepared from the leaves gives eaſe in external inflammations and in the hæmorrhoids. The ſeeds were lately recommended by Dr Storck to be taken internally in caſes of madneſs; but they ſeem to be a very unſafe remedy. Taken even in a ſmall doſe, they bring on a delirium, and in a large one would certainly prove fatal. Cows, horſes, ſheep, and goats, refuſe to eat this plant.

DATYL, in natural hiſtory, a ſort of PHOLAS.

DAUCUS, the CARROT; a genus of the digynia order, belonging to the pentandria claſs of plants. There are five ſpecies; but the only one which merits attention is the carota, or common carrot. This is ſo well known as to need no deſcription. There are ſeveral varieties, as the white, the orange, and the purple carrot; but of theſe the orange carrot is the moſt eſteemed. It grows longer, larger, and is commonly more handſome than the others, being often 15 or 18 inches long in the eatable part, and from two to four in diameter at top. Carrots are propagated by ſeeds, which are ſown at different ſeaſons of the year, in order to procure a ſupply of young roots for the table at all times. The ſeaſon for ſowing for the earlieſt crop is ſoon after Chriſtmas. They ſhould be ſown in an open ſituation, but near a wall; though if they are ſown cloſe under it they will be apt to run up to ſeed too faſt, and give no good roots: about eight inches diſtance is the moſt proper. They delight in a warm ſandy ſoil, which ſhould be light, and well dug to a good depth, that the roots may meet with no obſtruction in running down, ſo as to make them forked, and ſhoot out lateral branches. This will happen eſpecially when the ground has been too much dunged the ſame year that the ſeeds were ſown, which will alſo occaſion them to be worm-eaten. The hairyneſs of theſe ſeeds makes the ſowing of them difficult, on account of their being ſo apt to ſtick together. Before ſowing, therefore, they ſhould be put through a fine chaff ſieve; and a calm day ſhould be choſen for ſowing them. When ſown, they ſhould be trod in with the feet, and the ground raked level over them. When they firſt come up they ſhould be cut up to four inches diſtance, and a month after this they are to be cleared again; and if drawn while young, they are now to be left at ſix inches diſtance every way: if they are to ſtand to grow large, they muſt be ſeparated to ten inches diſtance. The ſecond ſeaſon for ſowing carrots is in February. This muſt be done under a wall or hedge, on warm banks: but thoſe which are to be on open large quarters ſhould not be ſown till the beginning of March. In July, carrots may be ſown for an autumnal crop; and laſtly, in the end of Auguſt, for thoſe which are to ſtand the winter. Theſe laſt will be fit for uſe in March, before any of the ſpring ones; but they are ſeldom ſo tender or well taſted. In order to preſerve carrots for uſe all winter, they are to be dug up in the beginning of November, and laid in a dry place in ſand; and theſe roots being again planted in February, will ripen ſeeds in Auguſt for ſucceeding crops: the longeſt and ſtraighteſt roots are to be choſen for this purpoſe.

Under the article AGRICULTURE, n° 44. we have taken notice of the good properties of carrots as a food for cattle. They have been greatly recommended as proper for fattening hogs; but from ſome experiments mentioned in the *Georgical Eſſays*, it appears, that tho' the bacon thus fed is of excellent quality, the feeding is conſiderably dearer than that fed with peaſe, pollard, &c. In the ſame eſſays, the following experiment is mentioned by Dr Hunter, concerning the propriety of raiſing carrots for the uſe of the diſtiller. "In the month of October (1773), I took 24 buſhels of carrots. After being waſhed, topped, and tailed, I put them into a large brewing copper with four gallons of water; and covering them up with cloths to haſten the maceration, I ordered a fire to be kindled underneath, which in a ſhort time reduced the whole into a tender pulp. They were then put into a common ſcrew-preſs, and the juice taken from them; which, together with the liquor left in the copper, was run through a flannel bag. The juice was then returned into the copper; and, as it was my deſign to make it into ale, I put to it a proportionable quantity of hops. The liquor was then boiled about an hour, when it acquired both the taſte and colour of wort. It was next put into a cooler, and afterwards into the working veſſel, where the yeaſt was added to it. It worked kindly, and in all reſpects was treated as ale. I allowed it to remain in the caſk about four months, when I broached it, but found it of a thick, muddy appearance. I attempted to fine it, but in vain. The taſte was by no means diſpleaſing, as it much reſembled malt liquor. My firſt intention being fruſtrated, I threw it into the ſtill, being about 40 gallons in meaſure, and by two diſtillations obtained four gallons of a clean proof ſpirit. It had, however, contracted a flavour from the hop, which ſhould be left out when the intention is to reduce the liquor into ſpirit. From a groſs calculation I am induced to think that a good acre of carrots manufactured in this manner, will leave a profit of L. 40, after deducting the landlord's rent, cultivation, diſtillation, and other incidental expences. In this calculation, I preſume that the ſpirit is worth ſix ſhillings per gallon, and not exciſed. An acre of barley will by no means produce ſo much ſpirit. A rich ſandy loam is the beſt land for carrots; which, after the crop is removed, will be in high cultivation for corn."

Attempts have alſo been made to prepare ſugar from carrots, but without ſucceſs; a thick ſyrupy matter like treacle being only obtainable.—Raw carrots are given to children troubled with worms. They paſs thro' moſt people but little changed.—A poultice made of the roots hath been found to mitigate the pain and abate the ſtench of foul and cancerous ulcers.—Crickets are very fond of carrots; and are eaſily deſtroyed by making a paſte of powdered arſenic, wheat-meal, and ſcraped carrots, which muſt be placed near their habitations.—By their ſtrong antiſeptic qualities, a marmalade made from carrots has alſo been found uſeful in preventing and curing the ſea-ſcurvy.—The ſeeds have been reckoned carminative and diuretic; and were formerly much uſed as a remedy for the ſtone, but are at preſent diſregarded.—Carrots were firſt introduced into England, by the Flemings, in the reign of queen Elizabeth.

DAVENANT (Sir William), an eminent poet in the 17th century, was born at Oxford in 1606. After ſome ſtay at the univerſity, he entered into the ſervice of Frances firſt ducheſs of Richmond, and afterward of Fulke Grevil, lord Brook; who having an excellent taſte for poetry, was much charmed with him. He got great eſteem by writing poems and plays; and upon the death of Ben Johnſon was created poet-laureat. He wrote his poem Gondibert at Paris. He formed a deſign for carrying over a conſiderable number of artificers, eſpecially weavers, to Virginia, by the encouragement of Henrietta Maria, the queen-mother of England, who obtained leave for him of the king of France. But he and his company were ſeized by ſome parliament ſhips, and he carried priſoner firſt to the Iſle of Wight, and then to the Tower of London; but, by the mediation of Milton and others, he got his liberty as a priſoner at large. At this time tragedies and comedies being prohibited, he contrived to ſet up an Opera, to be performed by declamations and muſic. This Italian opera began in Rutland-houſe in Charterhouſe-yard, 1656; but was afterwards removed to the Cock-Pit in Drury-Lane, and was much frequented for many years. In 1648, his Madagaſcar, with other poems, were printed. He died in 1668.

DAVENANT (Doctor Charles), an eminent civilian and writer, eldeſt ſon of the preceding, and educated in Cambridge: he wrote ſeveral political tracts; and likewiſe plays. He was (1685) impowered, with the maſter of the revels, to inſpect the plays deſigned for the ſtage, that no immoralities might be preſented. His Eſſays on Trade are in high eſteem; and were lately reprinted in 5 vols. 8vo. Doctor Davenant was inſpector-general of exports and imports; and died in 1712.

DAVENTRY, or DAINTRY, a handſome town of Northamptonſhire in England, ſituated on the ſide of a hill on the great road to Cheſter and Carliſle. W. Long. 1. 15. N. Lat. 52. 12.

DAUGHTER, *filia*, a female child. See the article CHILDREN.

DAVID, king of Iſrael, and Hebrew poet, was born at Bethlehem 1085, and died 1014 years B. C. His hiſtory is particularly recorded in the ſacred writings.

ST DAVID's, an epiſcopal town of Pembrokeſhire, in S. Wales; but has neither market nor fair. It is ſeated in a barren ſoil on the river Ilen, not a mile from the ſea-ſhore. It was once a conſiderable place, and had walls, which are now demoliſhed; but it is ſmall at preſent, and thinly inhabited; however, the cathedral is a pretty good ſtructure. From the cape, near this place, there is a proſpect into Ireland. W. Lon. 5. 20. N. Lat. 52. 0.

St **DAVID's**, a town and fort of Aſia, in the peninſula on this ſide the Ganges, and on the coaſt of Coromandel. It is an Engliſh factory, and one of the ſtrongeſt places they have in the Eaſt-Indies. The fort ſtands cloſe to the river, and the territory belonging to it is 8 miles on the ſea-ſhore, and 4 within land. It produces good long-cloths, chints, callicoes, and muſlins. Each houſe has a garden; and there are plenty of black cattle, but ſmall. The rivers and ſea abound with excellent fiſh. It is 80 miles S. of Fort St George. E. Long. 79. 55. N. Lat. 11. 30.

DAVIES (Sir John), an eminent lawyer and poet, born about the year 1570. He firſt diſtinguiſhed himſelf by his poem *Noſce Teipſum* on the Immortality of the Soul. He became attorney-general, and ſpeaker of the Houſe of Commons in Ireland; and afterward was appointed lord chief juſtice of the court of King's Bench in England, but died before his inſtallation, in 1626. He publiſhed many law tracts; but was eſteemed more of a ſcholar and a wit, than of a lawyer.

DAVILA (Henrico Catherino), a celebrated hiſtorian, was born of an illuſtrious family in the Iſle of Cyprus; but was obliged to leave his country, on its being taken by the Turks, in 1571. He firſt retired to Avila in Spain, whence his family ſuppoſed they had derived their name and origin; from thence he went to France, and made himſelf known at court under the reigns of Henry III. and Henry the Great. He there diſtinguiſhed himſelf on ſeveral occaſions by his valour; and at length went to Venice, where he had a very handſome penſion ſettled upon him by that republic, in whoſe ſervice his brother Lewis Davila had been a commander. Davila, while he was at Venice, wrote his admirable Hiſtory of the Civil Wars of France, which contains every thing worth notice that paſſed from the death of Henry II. in 1559, to the peace of Vervins in 1598. He was killed about the year 1635, by a gentleman of Verona; who, in a diſpute about furniſhing him with carriages in purſuance of his having a commiſſion from the republic, diſcharged a piſtol at Davila, and wounded him in ſuch a manner, that he died ſoon after. Davila's ſon, a youth of about 18, being preſent, had the ſpirit to revenge the death of his father; for, inſtantly ruſhing upon the murderer, he cut him in pieces.

DAVIS (John), a famous navigator in the 16th century, was born at Sandridge, near Dartmouth, in Devonſhire; and diſtinguiſhed himſelf by making three voyages to the moſt northern parts of America, in order to diſcover a North-weſt paſſage to the Eaſt-Indies; in which he diſcovered the Straits which bear his name. He afterwards performed five voyages to the Eaſt-Indies; in the laſt of which he was ſlain in a deſperate fight with ſome Japaneſe, near the coaſt of Malacca, on the 27th of December 1605. He wrote an account of his ſecond voyage for the diſcovery of the North-weſt paſſage; a Voyage to the Eaſt-Indies; and other tracts.

Davis's *Straits*. See *New* Britain.

DAVIT, in a ſhip, a long beam of timber, repreſented by *a*, *a*, Plate LXXXVII. fig. 2. and uſed as a crane whereby to hoiſt the flukes of the anchor to the top of the bow, without injuring the ſides of the ſhip as it aſcends; an operation which, by mariners, is called *fiſhing the anchor*. The anchors being ſituated on both the bows, the davit may be occaſionally ſhifted, ſo as to project over either ſide of the ſhip, according to the poſition of that anchor on which it is employed. The inner end of the davit is ſecured by being thruſt into a ſquare ring of iron *b*, which is bolted to the deck, and forelocked under the beams. This ring, which is called the *ſpan-ſhackle*, exhibited at large by fig. 9. is fixed exactly in the middle of the deck, and cloſe behind the foremaſt. Upon the outer end of the davit is hung a large block *c*, through which a ſtrong rope traverſes, called the *fiſh-pendent*, *d*; to whoſe foremoſt end is fitted a large iron hook *e*, and to its after-end a tackle or complication of pullies *f*; the former of which is called the *fiſh-hook*, and the latter the *fiſh-tackle*.

The davit, therefore, according to the ſea-phraſe, is employed to *fiſh the anchor*; which being previouſly *catted*, the fiſh-hook is faſtened upon its flukes; and the effort of the tackle being tranſmitted to the hook, by means of the fiſh-pendent, draws up that part of the anchor ſufficiently high upon the bow to faſten it, which is done by the *ſhank-painter*. See that article. —There is alſo a davit of a ſmaller kind occaſionally fixed in the long-boat, and employed to weigh the anchor therein.

DAUPHIN, a title given to the eldeſt ſon of France, and heir preſumptive of the crown, on account of the province of Dauphiny; which, in 1343, was given to Philip of Valois, on this condition, by Humbert, dauphin of the Viennois.

The ſeigneurs or lords of Auvergne have likewiſe borne the appellation of dauphin; but the dauphins of Auvergne held it not till a good while after thoſe of the Viennois, and even received it from them.

DAUPHINY, a province of France, bounded on the weſt by the river Rhone, on the north by the Rhone and Savoy, on the ſouth by Provence, and on the eaſt by the Alps. Hence the preſumptive heir of France is called the Dauphin. In ſome places it is very fertile; and produces corn, wine, olives, woad, copperas, ſilk, cryſtal, iron, and copper. But the greateſt part of this province is barren, and the inhabitants are obliged to go into other countries for ſubſiſtence. The mountains abound in ſimples and game of all ſorts; and here are fir-trees proper for maſts. The principal rivers are, the Rhone, the Durance, the Iſere, and the Drone. There a great number of mineral ſprings; and Grenoble is the capital town.

DAURAT (John), an eminent French poet, born in 1507. In the reign of Henry II. he was preceptor to the king's pages, and Charles IX. who took great delight in his converſation, and honoured him with the title of his poet: but his generoſity and want of management, placed him in that claſs of learned men who have been very near ſtarving. Conformable to the taſte of the age, he had ſo much ſkill in making anagrams, that ſeveral illuſtrious perſons gave him their names to anagrammatiſe: he alſo undertook to explain the Centuries of Noſtradamus. Making verſes was a diſeaſe in him: for no book was printed, nor did any perſon of conſequence die, but Daurat made ſome verſes on the occaſion; as if he had been poet in ordinary, or his muſe had been a hired mourner, to the whole kingdom. Scaliger tells us, that he ſpent the latter part of his life in endeavouring to find all the bible in Homer. He died in 1588.

DAY, according to the moſt natural and obvious ſenſe of the word, ſignifies that ſpace of time during which it continues to be light; in contradiſtinction to night, being that partition of time wherein it is dark: but the ſpace of time in which it is light, being ſomewhat vague and indeterminate, the time between the riſing and the ſetting of the ſun is uſually looked on as the day; and the time which lapſes from its ſetting to its riſing again, the night.

The word *day* is often taken in a large ſenſe, ſo as to include the night alſo; or to denote the time of a whole apparent revolution of the ſun round the earth; in which ſenſe it is called by ſome a natural day, and by others an artificial one: but, to avoid confuſion, it is uſual to call it in the former ſenſe ſimply the *day*, and in the latter a *nychthemeron*; by which term that acceptation of it is aptly denoted, as it implies both day and night.

The nychthemeron is divided into twenty-four parts, called *hours*; which are of two ſorts, equal and unequal or temporary. See the article Hour.

Different nations begin their day at a different hour. Thus the Egyptians began their day at midnight; from whom Hippocrates introduced that way of reckoning into aſtronomy, and Copernicus and others have followed him: But the greateſt part of aſtronomers reckon the day to begin at noon, and ſo count twenty-four hours, till the noon of the next day; and not twice twelve, according to the vulgar computation. The method of beginning the day at midnight prevails alſo in Great Britain, France, Spain, and moſt parts of Europe,

Europe. See Astronomy, n° 300.

The Babylonians began their day at ſun-riſing; reckoning the hour immediately before its riſing again, the twenty-fourth hour of the day; from whence the hours reckoned in this way are called the *Babylonic*. In ſeveral parts of Germany, they begin their day at ſun-ſetting, and reckon on till it ſets next day, calling that the *twenty-fourth hour*: theſe are generally termed *Italian hours*. The Jews alſo began their nychthemeron at ſun-ſetting: but then they divided it into twice twelve hours, as we do; reckoning twelve for the day, be it long or ſhort, and twelve for the night; ſo that their hours continually varying with the day and night, the hours of the day were longer than thoſe of the night for one half year, and the contrary the other; from whence their hours are called temporary: thoſe at the time of the equinoxes became equal, becauſe then thoſe of the day and night are ſo. The Romans alſo reckoned their hours after this manner, as do the Turks at this day.

This kind of hours is called *planetary*, becauſe the ſeven planets were anciently looked upon as preſiding over the affairs of the world, and to take it by turns each of theſe hours, according to the following order: Saturn firſt, then Jupiter, Mars, the Sun, Venus, Mercury, and laſt of all the Moon: hence they denominated each day of the week from that planet whoſe turn it was to preſide the firſt hour of the nychthemeron. Thus, aſſigning the firſt hour of Saturday to Saturn, the ſecond will fall to Jupiter, the third to Mars; and ſo the twenty-ſecond of the ſame nychthemeron will fall to Saturn again, and therefore the twenty-third to Jupiter, and the laſt to Mars: ſo that on the firſt hour of the next day, it will fall to the Sun to preſide; and by the like manner of reckoning, the firſt hour of the next will fall to the Moon; of the next, to Mars; of the next, to Mercury; of the next, to Venus: hence, the days of the week came to be diſtinguiſhed by the Latin names of *Dies Saturni*, *Solis*, *Lunæ*, *Martis*, *Mercurii*, *Jovis*, and *Veneris*; and among us, by the names of Saturday, Sunday, Monday, &c.

Day-*Coal*, in natural hiſtory, a name given by the miners of England, and the common people who live in coal-countries, to that ſeam or ſtratum of the coal which lies uppermoſt in the earth. The ſame vein or ſtratum of coal uſually runs a great way thro' the country, and dips and riſes in the earth at different places; ſo that this upper ſtratum, or day-coal, is, in the various parts of the ſame ſtratum, ſometimes near the ſurface, and ſometimes many fathoms deep. The ſubterranean fires found in ſome of our coal-countries feed principally on this coal; and are nearer to or farther from the ſurface, as it riſes or ſinks.

Sportman's Dict.

Day-*Net*, among fowlers, a net generally uſed for taking ſuch ſmall birds as play in the air, and will ſtoop either to prey, gig, or the like; as larks, linnets, buntings, &c. The time of the year for uſing this net is from Auguſt to November; and the beſt time is very early in the morning: and it is to be obſerved, that the milder the air, and the brighter the ſun is, the better will be the ſport, and of longer continuance. The place where this net ſhould be laid, ought to be plain champaign, either on ſhort ſtubbles, green lays, or flat meadows, near corn-fields, and ſomewhat remote from towns and villages: you muſt be ſure to let your net lie cloſe to the ground, that the birds creep not out and make their eſcape.—The net is made of a fine pack-thread with a ſmall meſh, not exceeding half an inch ſquare; it muſt be three fathoms long, and but one broad: it muſt be verged about with a ſmall, but ſtrong, cord; and the two ends extended upon two ſmall, long, poles, ſuitable to the breadth of the net, with four ſtakes, tail-ſtrings, and drawing-lines.—This net is compoſed of two, which muſt be exactly alike; and are to be laid oppoſite to one another, ſo even and cloſe, that when they are drawn and pulled over, the ſides muſt meet and touch each other.—You muſt ſtake this net down with ſtrong ſtakes, very ſtiff on their lines, ſo that you may with a nimble touch caſt them to and fro at pleaſure; then faſten your drawing-cords or hand-lines (of which there muſt be a dozen at leaſt, and each two yards long) to the upper end of the foremoſt ſtaves: and ſo extend them of ſuch a ſtraightneſs, that with a little ſtrength they may riſe up in the nets, and caſt them over.

Your nets being thus laid, place your gigs, or playing-wantons, about 20 or 30 paces beyond, and as much on this ſide your nets: the gigs muſt be faſtened to the tops of long poles, and turned into the wind, ſo as they may play to make a noiſe therein. Theſe gigs are a ſort of toys made of long gooſe-feathers, like ſhuttle-cocks, and with little ſmall tunnels of wood running in broad and flat ſwan-quills, made round like a ſmall hoop; and ſo, with longer ſtrings faſtened to a pole, will, with any ſmall wind or air, move after ſuch a manner, that birds will come in great flocks to play about them.

When you have placed your gigs, then place your ſtale; which is a ſmall ſtake of wood, to prick down into the earth, having in it a mortice-hole, in which a ſmall and ſlender piece of wood, about two foot long, is faſtened, ſo as it may move up and down at pleaſure: and faſten to this longer ſtick a ſmall line, which, running through a hole in the ſtick abovementioned, and ſo coming up to the place where you are to ſit, you may, by drawing the line up and down with your right hand, raiſe up the longer ſtick as you ſee occaſion.

Faſten a live lark, or ſuch like bird, to this longer ſtick, which, with the line making it to ſtir up and down by your pulling, will entice the birds to come to your net.

There is another ſtale, or enticement, to draw on theſe birds, called a *looking-glaſs*; which is a round ſtake of wood, as big as a man's arm, made very ſharp at the end, to thruſt it into the ground: they make it very hollow in the upper part, above five fingers deep; into which hollow they place a three-ſquare piece of wood about a foot long, and each two inches broad, lying upon the top of the ſtake, and going with a foot into the hollowneſs: which foot muſt have a great knob at the top, and another at the bottom, with a deep ſlenderneſs between; to which ſlenderneſs you are to faſten a ſmall pack-thread, which, running through a hole in the ſide of the ſtake, muſt come up to the place where you ſit. The three-ſquare piece of wood which lies on the top of the ſtake, muſt be of ſuch a poiſe and evenneſs, and the foot of the ſocket ſo ſmooth and round, that it may whirl and turn round upon the leaſt touch; winding the pack-thread ſo many times about it, which being ſuddenly drawn, and as ſuddenly let go, will keep the engine in a conſtant rotatory motion: then faſten with glue on the uppermoſt flat ſquares of the three-ſquare piece, about twenty ſmall pieces of looking-glaſs, and paint all the ſquare wood between them of a light and lively red: which, in the continual motion, will give ſuch a reflection, that the birds will play about to admiration until they are taken.

Both this and the other ſtale are to be placed in the middle between the two nets, about two or three feet diſtance from each other; ſo that, in the falling of the nets, the cords may not touch or annoy them: neither muſt they ſtand one before or after another; the glaſs being kept in a continual motion, and the bird very often fluttering. Having placed your nets in this manner, as alſo your gigs and ſtales, go to the further end of your long-drawing lines and ſtale lines; and, having placed yourſelf, lay the main drawing line acroſs your thigh, and, with your left, pull the ſtale-line to ſhew the birds; and when you perceive them to play near and about your nets and ſtales, then pull the net over with both hands, with a quick, but not too haſty motion; for otherwiſe your ſport will be ſpoiled.

See Plate XCV. fig. 1. where A ſhews the bodies of the main net, and how they ought to be laid. B, the tail-lines, or the hinder lines, ſtaked to the ground. C, the fore-lines ſtaked alſo to the ground. D, the bird-ſtale. E, the looking-glaſs ſtale. G, the line which draws the bird-ſtale. H, the line that draws the glaſs-ſtale. I, the drawing, double lines of the nets, which pulls them over. K, the ſtakes which ſtake down the four nether points of the net, and the two tail-lines. L, the ſtakes that ſtake down the fore-lines, M, the ſingle line, with the wooden button to pull the net over with. N, the ſtake that ſtakes down the ſingle line, and where the man ſhould ſit; and Q the gig.

DAYS *of Grace* are thoſe granted by the court at the prayer of the defendant, or plaintiff, in whoſe delay it is.

Days of grace, in commerce, are a cuſtomary number of days allowed for the payment of a bill of exchange, &c. after the ſame becomes due.

Three days of grace are allowed in Britain; ten in France and Dantzic; eight at Naples; ſix at Venice, Amſterdam, Rotterdam, and Antwerp; four at Francfort; five in Leipſic; twelve at Hamburg; ſix in Portugal; fourteen in Spain; thirty in Genoa, &c.

DAY'S-*Man*, in the north of England, an arbitrator or perſon choſen to determine an affair in diſpute.

Intercalary DAYS. See INTERCALARY *Days*.

DAY'S-*Work*, among ſeamen, the reckoning or account of the ſhip's courſe during 24 hours, or between noon and noon, according to the rules of trigonometry. See DEAD-*Reckoning*.

DAZE, in natural hiſtory, a name given by our miners to a glittering ſort of ſtone, which often occurs in their works; and, as it is unprofitable ſubſtance, is one of thoſe things they call *weeds*. The word *daze* takes in with them every ſtone that is hard and glittering; and therefore it comprehends the whole genus of the telangia, or ſtony modules, which have the flakes of talc in their ſubſtance: theſe, according to the colour of the ſtony matter they are bedded in, and their own colour, give the names of *black daze*, *white*, *red*, and *yellow daze*, to theſe ſtones.

DEACON, DIACONUS, a perſon in the loweſt degree of holy orders, whoſe buſineſs is to baptize, read in the church, and aſſiſt at the celebration of the euchariſt. The word is formed from the Latin *Diaconus*, of the Greek διακονος, miniſter, ſervant. Deacons were inſtituted ſeven in number, by the apoſtles, *Acts* chap. vi. which number was retained a long time in ſeveral churches. Their office was to ſerve in the Agapæ, and to diſtribute the bread and wine to the communicants. Another part of the office of deacons, was to be a ſort of monitors and directors to the people in the exerciſe of their public devotions in the church; for which purpoſe they made uſe of certain known forms of words, to give notice when each part of the ſervice began. Whence they are ſometimes called *eirokerukes*; "the holy cryers of the church."

Deacons had, by licence and authority from the biſhop, a power to preach, to reconcile penitents and grant them abſolution, and to repreſent their biſhops in general councils. Their office out of the church was to take care of the neceſſitous, ſuch as orphans, widows, priſoners, and all the poor and ſick who had any title to be maintained out of the revenues of the church; to inquire into the morals and converſation of the people, and to make their report thereof to the biſhop. Whence, on account of the variety of buſineſs, it was uſual to have ſeveral deacons in the ſame church.

In the Romiſh church, it is the deacon's office to incenſe the officiating prieſt or prelate; to lay the corporal on the altar; to receive the patten or cup from the ſubdeacon, and preſent them to the perſon officiating; to incenſe the choir; to receive the pax from the officiating prelate, and carry it to the ſubdeacon; and at the pontifical maſs, when the biſhop gives the bleſſing, to put the mitre on his head, and to take off the archbiſhop's pall and lay it on the altar. In England, the form of ordaining deacons, declares that it is their office to aſſiſt the prieſt in the diſtribution of the holy communion; in which, agreeably to the practice of the ancient church, they are confined to the adminiſtering the wine to the communicants. A deacon in England is not capable of any eccleſiaſtical promotion; yet he may be a chaplain to a family, curate to a beneficed clergyman, or lecturer to a pariſh-church. He may be ordained at 23 years of age, *anno currente*; but it is expreſly provided, that the biſhop ſhall not ordain the ſame perſon a prieſt and deacon in the ſame day. Deacons, according to St Paul, ſhould be chaſte, ſincere, and blameleſs; neither great drinkers, nor given to filthy lucre: they ſhould hold the myſtery of the faith in a pure conſcience; and ſhould be well approved before they are admitted to the miniſtry.

DEACONESS, *a female deacon*; an order of women who had their diſtinct offices and ſervices in the primitive church. This office appears as ancient as the apoſtolical age; for St Paul calls Phebe a ſervant of the church of Cenchrea. The original word is διακονος, anſwerable to the Latin word *miniſtra*. Tertullian calls them *viduæ*, widows, becauſe they were commonly choſen out of the widows of the church; and, for the ſame reaſon, Epiphanius, and the council of Laodicea, calls them πρεσβυτιδας, elderly women, becauſe none but ſuch were ordinarily taken into this office. For, indeed, by ſome ancient laws, theſe four qualifications were required in every one that was to be admitted into this order. 1. That ſhe ſhould be a widow. 2. That ſhe ſhould be a widow that had born children. 3. A widow that was but once married. 4. One of a conſiderable age, 40, 50, or 60 years old. Though all theſe rules admitted of exceptions. Concerning their ordination, whether it was always performed by impoſition of hands, the learned are much divided in their ſentiments. Baronius and Valeſius think they were not, and make no other account of them than as mere lay-perſons. But the author of the conſtitutions, ſpeaking of their ordination, requires the biſhop to uſe impoſition of hands, with a form of prayer which is there recited. We are not, however, to imagine, that this ordination gave them any power to execute any part of the ſacerdotal office. They were only to perform ſome inferior ſervices of the church, and thoſe chiefly relating to the women for whoſe ſakes they were ordained. One part of their office was to aſſiſt the miniſter at the baptizing of women, to undreſs them for immerſion, and to dreſs them again, that the whole ceremony might be performed with all the decency becoming ſo ſacred an action. Another part of their office was to be private catechiſts to the women-catechumens who were preparing for baptiſm. They were likewiſe to attend the women that were ſick and in diſtreſs; to miniſter to martyrs and confeſſors in priſon; to attend the womens gate in the church; and, laſtly, to aſſign all women their places in the church, regulate their behaviour, and preſide over the reſt of the widows; whence in ſome canons they are ſtyled *προκαθημεναι*, "governeſſes." This order, which ſince the 10th or 12th century has been wholly laid aſide, was not aboliſhed every where at once, but continued in the Greek church longer than in the Latin, and in ſome of the Latin churches longer than in others.

DEAD LANGUAGES. See PHILOLOGY, chap. iii.

Preſervation of DEAD *Bodies*. See EMBALMING.

DEAD-*Lights*, certain wooden ports which are made to faſten into the cabin windows, to prevent the waves from guſhing into the ſhip in a high ſea. As they are made exactly to fit the windows, and are ſtrong enough to reſiſt the waves, they are always fixed in on the approach of a ſtorm, and the glaſs lights taken out, which muſt otherwiſe be ſhattered to pieces by the ſurges, and ſuffer great quantities of water to enter the veſſel.

DEAD-*mens-eyes*, in the ſea-language, a kind of blocks with many holes in them, but no ſheevers, whereby the ſhrowds are faſtened to the chains: the crow-feet reeve alſo through theſe holes; and, in ſome ſhips, the main-ſtays are ſet tight in them; but then they have only one hole, through which the lanyards are paſſed ſeveral times. See Plate LXXXVII. fig. 3.

DEAD'S *Part*. See LAW, N° clxxxi. 6.

DEAD-*Reckoning*, in navigation, the judgement or eſtimation which is made of the place where a ſhip is ſituated; without any obſervation of the heavenly bodies. It is diſcovered by keeping an account of the diſtance ſhe has run by the log, and of her courſe ſteered by the compaſs; and by rectifying theſe data by the uſual allowances for drift, lee-way, &c. according to the ſhip's known trim. This reckoning, however, is always to be corrected, as often as any good obſervation of the ſun can be obtained.

DEAD-*Sea*, in geography, a lake of Judea, into which the river Jordan diſcharges itſelf; being about 70 miles long, and 20 broad. See ASPHALTITES.

DEAD-*Tops*, a diſeaſe incident to young trees, and cured by cutting off the dead parts cloſe to the next good twig or ſhoot, and claying them over as in grafting.

DEAD-*Water*, at ſea, the eddy-water juſt aſtern of a ſhip; ſo called, becauſe it does not paſs away ſo ſwift as the water running by her ſides does. They ſay that a ſhip makes much dead-water, when ſhe has a great eddy following her ſtern.

DEADLY-CARROT. See THAPSIA.

DEADLY-*Feud*, in Engliſh law-books, a profeſſion of irreconcileable enmity, till a perſon is revenged by the death of his enemy. The word *feud* is derived from the German *Fehd*; which, as Hottoman obſerves, ſignifies *modo bellum, modo capitales inimicitias* *. Such enmity and revenge was allowed by law in the time of the Saxons, viz. If any man was killed, and a pecuniary ſatisfaction was not made to the kindred, it was lawful for them to take up arms and revenge themſelves on the murderer: which was called *deadly feud*. And this probably was the original of an APPEAL.

* See *Feud*.

DEAFNESS, the ſtate of a perſon who wants the ſenſe of hearing; or the diſeaſe of the ear, which prevents its due reception of ſounds ‡.

‡ See (Index ſubjoined to) *Medicine*.

Deafneſs generally ariſes either from an obſtruction, or a compreſſion, of the auditory nerve; or from ſome collection of matter in the cavities of the inner ear; or from the auditory paſſage being ſtopped up by ſome hardened excrement; or, laſtly, from ſome excreſcence, a ſwelling of the glands, or ſome foreign body introduced within it.

Thoſe born deaf are alſo dumb, as not being able to learn any language; at leaſt in the common way. However, as the eyes in ſome meaſure ſerve them for ears, they may underſtand what is ſaid by the motion of the lips, tongue, &c. of the ſpeaker; and even accuſtom themſelves to move their own, as they ſee other people do; and by this means learn to ſpeak.—Thus it was that Dr Wallis taught two young gentlemen born deaf, to know what was ſaid to them, and to return pertinent anſwers. Digby gives us another inſtance of the ſame, within his own knowledge. And there was a Swiſs phyſician lately living at Amſterdam, one John Conrad Amman, who effected the ſame in ſeveral children born deaf, with ſurpriſing ſucceſs. He has reduced the thing to a fixed art or method, which he has publiſhed in his *Surdus Loquens*, Amſtelod. 1692, and *de Loquela*, ibid. 1700.

In the Phil. Tranſ. N° 312. we have an account by Mr Waller, R. S. Secr. of a man and his ſiſter, each about 50 years old, born in the ſame town with Mr Waller, who had neither of them the leaſt ſenſe of hearing; yet both of them knew, by the motion of the lips only, whatever was ſaid to them, and would anſwer pertinently to the queſtion propoſed. It ſeems they could both hear and ſpeak when children; but loſt their ſenſe afterwards; whence they retained their ſpeech, which, though uncouth, was yet intelligible.

Such another inſtance is that of Mr Goddy's daughter, miniſter of St Gervais in Geneva, related by biſhop Burnet. "At two years old they perceived ſhe had loſt her hearing; and ever ſince, though ſhe hears great noiſes, yet hears nothing of what is ſaid to her.

But by obſerving the motions of the mouth and lips of others, ſhe acquired ſo many words, that out of theſe ſhe has formed a ſort of jargon, in which ſhe can hold converſation whole days with thoſe that can ſpeak her language. She knows nothing that is ſaid to her, unleſs ſhe ſee the motion of their mouths that ſpeak to her; ſo that in the night they are obliged to light candles to ſpeak to her. One thing will appear the ſtrangeſt part of the whole narration: ſhe has a ſiſter, with whom ſhe has practiſed her language more than with any body elſe; and in the night, by laying her hand on her ſiſter's mouth, ſhe can perceive by that what ſhe ſaith, and ſo can diſcourſe with her in the dark." *Burn. Let.* IV. p. 248 *.

It is obſervable that deaf perſons, and ſeveral others thick of hearing, hear better and more eaſily if a loud noiſe be raiſed at the time when you ſpeak to them: which is owing, no doubt, to the greater tenſion of the ear-drum on that occaſion. Dr Willis mentions a deaf woman, who, if a drum were beat in the room, could hear any thing very clearly; ſo that her huſband hired a drummer for a ſervant, that by this means he might hold converſation with his wife. The ſame author mentions another, who, living near a ſteeple, could always hear very well if there was a ringing of three or four bells, but never elſe.

DEAL, a thin kind of fir-planks, of great uſe in carpentry: they are formed by ſawing the trunk of a tree into a great many longitudinal diviſions, of more or leſs thickneſs according to the purpoſes they are intended to ſerve.

A very good method of ſeaſoning planks of deal and fir, is to throw them into ſalt water as ſoon as they are ſawed; and keep them there three or four days, frequently turning them. In this caſe they will be rendered much harder, by drying afterwards in the air and ſun: but neither this nor any other method yet known will preſerve them from ſhrinking.

Rods of deal expand laterally, or croſs the grain, in moiſt weather, and contract again in dry; and thence have been found to make an uſeful hygrometer.

Deal, a town of Kent in England, lying between Dover and Sandwich, in E. Long. 1. 30. N. Lat. 51. 16. is ſuppoſed to be the *Dola* of Nennius, and is ſituated on a flat and level coaſt. This town, according to Dr Campbell, juſtifies an obſervation he had made in favour of ſituations of this kind, viz. that they are leſs liable than others to be injured by the ſea. The town of Deal, as far as we are able to judge, except it may be the ſea's ſhrinking a little from it, is in much the ſame condition in which it ever was, even from the earlieſt accounts. The learned Dr Halley has proved, *Miſcellanea Curioſa*, vol. iii. p. 426, that Julius Cæſar landed here, Auguſt 26th, the year before the coming of Chriſt 55.—The great conveniency of landing, has been of infinite ſervice to the place; ſo that it is large and populous, divided into the upper and lower towns, adorned with many fair buildings, and is in effect the principal place on the Downs.

DEAN, an eccleſiaſtical dignitary in cathedral and collegiate churches, and head of the Chapter.

Rural **Dean**, called alſo *Arch-preſbyter*, originally exerciſed juriſdiction over ten churches in the country, and afterwards became only the biſhop's ſubſtitute, to grant letters of adminiſtration, probate of wills, &c.; to convocate the clergy; and to ſignify to them ſometimes by letters the biſhop's will, and to give induction to the arch-deacon. Their office is now loſt in that of the arch-deacons and chancellors.

Dean *of a Monaſtery*, was a ſuperior eſtabliſhed under the abbot, to eaſe him in taking care of ten monks; whence he was called *decanus*.

Dean *and Chapter*, are the council of the biſhop, to aſſiſt him with their advice in affairs of religion, and alſo in the temporal concerns of his ſee. When the reſt of the clergy were ſettled in the ſeveral pariſhes of each dioceſe, theſe were reſerved for the celebration of divine ſervice in the biſhop's own cathedral; and the chief of them, who preſided over the reſt, obtained the name of *decanus* or *dean*, being probably at firſt appointed to ſuperintend ten canons or prebendaries.

All ancient deans are elected by the chapter, by *conge d'eſlire* from the king, and letters miſſive of recommendation; in the ſame manner as biſhops: but in thoſe chapters that were founded by Henry VIII. out of the ſpoils of the diſſolved monaſteries, the deanery is donative, and the inſtallation merely by the king's letters patent. The chapter, conſiſting of canons or prebendaries, are ſometimes appointed by the king, ſometimes by the biſhop, and ſometimes elected by each other.

The dean and chapter, are the nominal electors of a biſhop. The biſhop is their ordinary and immediate ſuperior; and has, generally ſpeaking, the power of viſiting them, and correcting their exceſſes and enormities. They had alſo a check on the biſhop at common law; for till the ſtatute 32 Hen. VIII. c. 28. his grant or leaſe would not have bound his ſucceſſors, unleſs confirmed by the dean and chapter.

Dean *of Guild*. See **Law**, N° clviii. 11.

DEANERY, the office of a **dean**.—Deaneries and prebends may become void, like a biſhopric, by death, by deprivation, or by reſignation either to the king or biſhop. If a dean, prebendary, or other ſpiritual perſon, be made a biſhop, all the preferments of which he was before poſſeſſed are void; and the king may preſent to them, in right of his prerogative royal. But they are not void by the election, but only by the conſecration.

DEATH, is generally conſidered as the ſeparation of the ſoul from the body; in which ſenſe it ſtands oppoſed to life, which conſiſts in the union thereof.

Phyſicians uſually define death by a total ſtoppage of the circulation of the blood, and a ceſſation of the animal and vital functions conſequent thereon; as reſpiration, ſenſation, &c.

An animal body, by the actions inſeparable from life, undergoes a continual change. Its ſmalleſt fibres become rigid; its minute veſſels grow into ſolid fibres no longer pervious to the fluids; its greater veſſels grow hard and narrow; and every thing becomes contracted, cloſed, and bound up: whence the dryneſs, immobility, and extenuation, obſerved in old age. By ſuch means the offices of the minuter veſſels are deſtroyed; the humours ſtagnate, harden, and at length coaleſce with the ſolids. Thus are the ſubtileſt fluids in the body intercepted and loſt, the concoction weakened, and the reparation prevented; only the coarſer juices continue to run ſlowly through the greater veſſels, to the preſervation of life, after the animal functions are deſtroyed. At length, in the proceſs of theſe changes, death itſelf becomes inevitable, as the neceſſary conſequence of life. But it is rare that life is thus long protracted, or that death ſucceeds merely from the decays and impairment of old age. Diſeaſes, a long and horrid train, cut the work ſhort.

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* See further the article *Dumbneſs*.

The ſigns of death are in many caſes very uncertain. If we conſult what Winſlow or Bruchier have ſaid on this ſubject, we ſhall be convinced, that between life and death the ſhade is ſo very undiſtinguiſhable, that even all the powers of art can ſcarcely determine where the one ends and the other begins. The colour of the viſage, the warmth of the body, and ſuppleneſs of the joints, are but uncertain ſigns of life ſtill ſubſiſting; while, on the contrary, the paleneſs of the complexion, the coldneſs of the body, the ſtiffneſs of the extremities, the ceſſation of all motion, and the total inſenſibility of the parts, are but uncertain marks of death begun. In the ſame manner alſo, with regard to the pulſe and breathing; theſe motions are often ſo kept under, that it is impoſſible to perceive them. By bringing a looking-glaſs near to the mouth of the perſon ſuppoſed to be dead, people often expect to find whether he breathes or not. But this is a very uncertain experiment: the glaſs is frequently ſullied by the vapour of the dead man's body; and often the perſon is ſtill alive, though the glaſs is no way tarniſhed. In the ſame manner, neither burning nor ſcarifying, neither noiſes in the ears nor pungent ſpirits applied to the noſtrils, give certain ſigns of the diſcontinuance of life; and there are many inſtances of perſons who have endured them all, and afterwards recovered, without any external aſſiſtance, to the aſtoniſhment of the ſpectators. This ought to be a caution againſt haſty burials, eſpecially in caſes of ſudden death, drowning, &c.

DEATH *in Law*. In law, there is a natural death and a civil death: natural, where nature itſelf expires; civil, where a perſon is not actually dead, but adjudged ſo by law. Thus, if any perſon, for whoſe life an eſtate is granted, remains beyond ſea, or is otherwiſe abſent, ſeven years, and no proof made of his being alive, he ſhall be accounted naturally dead.

Law of DEATHBED. See LAW, N° clxxxi. 38—41.

DEATH-*Watch*, in natural hiſtory, a little inſect famous for a ticking noiſe, like the beat of a watch, which the vulgar have long taken for a preſage of death in the family where it is heard: whence it is alſo called *pediculus*, *fatidicus*, *mortiſaga*, *pulſatorius*, &c.

There are two kinds of death-watches. Of the firſt we have a good account in the Phil. Tranſ. by Mr Allen. It is a ſmall beetle $\frac{5}{16}$ of an inch long, of a dark-brown colour, ſpotted; having pellucid wings under the vagina, a large cap or helmet on the head, and two antennæ proceeding from beneath the eyes, and doing the office of proboſcides. The part it beats withal, he obſerved, was the extreme edge of the face, which he chuſes to call the upper-lip, the mouth being protracted by this bony part, and lying underneath out of view.

This account is confirmed by Dr Derham; with this difference, that inſtead of ticking with the upper-lip, he obſerved the inſect to draw back its mouth, and beat with its forehead. That author had two death-watches, a male and a female, which he kept alive in a box ſeveral months; and could bring one of them to beat whenever he pleaſed, by imitating its beating By his ticking noiſe he could frequently invite the male to get up upon the other in the way of coition. When the male found he got up in vain, he would get off again, beat very eagerly, and then up again: Whence the ingenious author concludes, thoſe pulſations to be the way whereby theſe inſects woo one another, and find out and invite each other to copulation.

The ſecond kind of death-watch is an inſect in appearance quite different from the firſt. The former only beats ſeven or eight ſtrokes at a time, and quicker; the latter will beat ſome hours together without intermiſſion; and his ſtrokes are more leiſurely, and like the beat of a watch. This latter is a ſmall greyiſh inſect, much like a louſe when viewed with the naked eye.

It is very common in all parts of the houſe in the ſummer-months: it is very nimble in running to ſhelter, and ſhy of beating when diſturbed; but will beat very freely before you, and alſo anſwer the beating, if you can view it without giving it diſturbance, or ſhaking the place where it lies, &c. The author cannot ſay whether they beat in any other thing, but he never heard their noiſe except in or near paper. As to their noiſe, the ſame perſon is in doubt, whether it be made by their heads, or rather ſnouts, againſt the paper; or, whether it be not made after ſome ſuch manner as graſhoppers and crickets make their noiſe. He inclines to the former opinion: the reaſon of his doubt is, that he obſerved the animal's body to ſhake and give a jerk at every beat, but could ſcarce perceive any part of its body to touch the paper. But its body is ſo ſmall and near the paper, and its motion in ticking ſo quick, that he thinks it might be, yet he not perceive it. The ticking, as in the other, he judges to be a wooing-act; as having obſerved another, after much beating, come and make offers to the beating inſect, who, after ſome offers, left off beating, and got upon the back the other. When they were joined, he left off again; and they continued ſome hours joined tail to tail, like dog and bitch in coition. Whether this inſect changes its ſhape and becomes another animal, or not, he cannot ſay; though he has ſome cauſe to ſuſpect that it becomes a ſort of fly. It is at firſt a minute white egg, much ſmaller than the nits of lice; though the inſect is near as big as a louſe. In March it is hatched, and creeps about with its ſhell on. When it firſt leaves its ſhell, it is even ſmaller than its egg; though that be ſcarce diſcernible without a microſcope. In this ſtate it is perfectly like the mites in cheeſe: from the mite-ſtate they grow gradually to their mature perfect ſtate; when they become like the old ones, they are at firſt very ſmall, but run about much more ſwiftly than before.

DEBENTURE, a term of trade uſed at the cuſtom-houſe for a kind of certificate ſigned by the officers of the cuſtoms, which entitles a merchant exporting goods to the receipt of a bounty or draw-back. All merchandiſes that are deſigned to be taken on board for that voyage being entered and ſhipped, and the ſhip being regularly cleared out, and ſailed out of port on her intended voyage, debentures may be made out from the exporter's entries, in order to obtain the drawbacks, allowances, bounties, or premiums; which debentures for foreign goods are to be paid within one month after demand. And in making out theſe debentures, it muſt be obſerved, that every piece of vellum,

lum, parchment, or paper, containing any debenture for drawing back cuſtoms or duties, muſt, before writing, be ſtamped, and pay a duty of 8d.

The forms of debentures vary, according to the merchandiſe exported. In the execution of debentures for tobacco, it muſt be particularly obſerved, 1. That debentures for the ſame quantity, may be made on one or more parchments. 2. That the exporter's oath muſt be printed, ſpecifying whether he acts for himſelf or on commiſſion. If exported to any other foreign ports than Ireland, the word *Ireland* muſt be added to the oath after *Great-Britain*. 4. That as no tobacco may be conſumed on board ſhips of war in Europe, but what has paid full duties, and been manufactured in Great Britain, no drawback is to be allowed for tobacco exported in any man of war. 5. That the eight pounds *per* hogſhead of 350 pounds, or more, allowed for draught at importation, muſt not be deducted on exportation. 6. That debentures for tobacco exported to Ireland, muſt not be paid till a certificate be produced, teſtifying the landing thereof. 7. That no perſons may ſwear to the exportation, but ſuch as are permitted to ſwear to debentures for other goods. In debentures for all other foreign goods, no perſon may be admitted to ſwear to the exportation, but the true exporter, either as a proprietor, or who, being employed by commiſſion, is concerned in the direction of the voyage. All kinds of debentures, before delivered or paid to the exporters, are entered into a ſeparate book kept for that purpoſe by the collector and comptroller of the cuſtoms.

DEBITA FUNDI. See LAW, N° clxvi. 1.

DEBITA *Fructuum*. See LAW, N° clxx. 17.

DEBILITY, among phyſicians, a relaxation of the ſolids, occaſioning oftentimes weakneſſes and faintings.

DEBRECHEN, a town of Upper Hungary, about 77 miles eaſt of Buda: E. Long. 21. 10. N. Lat. 47. 45.

DEBRUIZED, in heraldry, a term peculiar to the Engliſh, by which is intimated the grievous reſtraint of any animal, debarred of its natural freedom, by any of the ordinaries being laid over it.

DEBT, in law, any thing due to another, whether it be money, goods, or ſervices; or the action brought for recovering the ſame.

DEBTOR, a perſon who owes any thing to another; in contradiſtinction to creditor, which is he to the debt is owing.

DEBTOR, in merchants accounts. See BOOK-KEEPING.

DECAGON, in geometry, a plane figure with ten ſides and ten angles.

DECAGYNIA, (from δεκα *ten*, and γυνη a *woman;*) the name of an order, or ſecondary diviſion, in the claſs decandria, of the ſexual method, conſiſting of plants whoſe flowers are furniſhed with ten ſtamina and the ſame number of ſtyles; which laſt are conſidered by Linnæus, and the ſexualiſts, as the female organs of generation in plants. Neurada, and American night-ſhade, furniſh examples.

DECALOGUE, the ten precepts or commandments delivered by God to Moſes, after engraving them on two tables of ſtone.

The Jews, by way of excellence, call theſe commandments the *ten words*, from whence they had afterwards the name of *decalogue:* but it is to be obſerved, that they joined the firſt and ſecond into one, and divided the laſt into two: they underſtand that againſt ſtealing, to relate to the ſtealing of men, or kidnapping; alleging, that the ſtealing one anothers goods or property, is forbidden in the laſt commandment.

The emperor Julian objected to the decalogue, that the precepts it contained (thoſe only excepted which concern the worſhip of falſe gods, and the obſervation of the ſabbath) were already ſo familiar to all nations, and ſo univerſally received, that they were unworthy, for that very reaſon, to be delivered, by ſo great a legiſlator, to ſo peculiar a people. The church of Rome has ſtruck the ſecond commandment quite out of the decalogue; and to make their number complete, hath ſplit the tenth into two: The reaſon of which may be eaſily conceived.

DECAN, a kingdom of Aſia, in the peninſula on this ſide the Ganges, bounded on the ſouth by the kingdom of Biſnagar, on the weſt by the ocean, on the north by Moguliſtan, and on the eaſt by the mountains which ſeparate it from Golconda.

DECANDRIA (δεκα *ten*, and ανηρ a *huſband*); Linnæus's tenth claſs, comprehending thoſe hermaphrodite plants which bear flowers with ten ſtamina. See BOTANY, p. 1292, and Plate LIX. fig. 10.

DECANTATION, among chemiſts, &c. the gently pouring off a liquor from its fæces, by inclining the lip or *canthus* of the veſſel; whence the name.

DECANUS, in Roman antiquity, an officer who preſided over the other ten officers, and was head of the contuberinum, or ſerjeant of a file of ſoldiers.

DECAPROTI, DECEMPRIMI, in Roman antiquity, officers for gathering the tributes and taxes.

The decaproti were alſo obliged to pay for the dead, or to anſwer to the emperor for the quota parts of ſuch as died, out of their own eſtates.

DECASTYLE, in the ancient architecture, a building with an ordnance of ten columns in front, as the temple of Jupiter Olympius was.

DECEIT, in law; a ſubtle trick, or device, to which may be added all manner of craft and colluſion, or underhand practice, uſed to defraud another, by any means whatever.

DECEMBER, the laſt month of the year, conſiſting of thirty-one days; and ſo called as being the tenth month in the Roman year, which commenced with March.

DECEMPEDA, in antiquity, a rule or rod divided into ten feet, each of which was ſubdivided into inches, and thoſe into digits, uſed in meaſuring of land, and, by architects, in giving the proper dimenſions and proportions to the parts of their buildings.

DECEMVIRI, in Roman antiquity, ten magiſtrates choſen annually at Rome, to govern the commonwealth inſtead of conſuls, with an abſolute power to draw up and make laws for the people.

One of the decemvirs had all the enſigns and honours of the function, and the reſt had the like in their turn, during the year of their decemvirate. In them was veſted all the legiſlative authority ever enjoyed by the kings, or, after them, by the conſuls. It was the decemviri that drew up the laws of the Twelve Tables, thence called *leges decemvirales*, which were the whole ot the Roman law for a conſiderable time.

DECENNALIA, ancient Roman feſtivals, celebrated by the emperors every tenth year of their reign, with ſacrifices, games, and largeſſes for the people. The emperor Auguſtus firſt inſtituted theſe ſolemnities, in which he was imitated by his ſucceſſors. At the ſame time the people offered up vows for the emperor, and for the perpetuity of the empire; which were therefore called *vota decennalia*. Auguſtus's view in eſtabliſhing the decennalia was to preſerve the empire and the ſovereign power without offence or reſtraint to the people. For during the celebration of this feaſt, that prince uſed to ſurrender up all his authority into the hands of the people; who, filled with joy, and charmed with the goodneſs of Auguſtus, immediately delivered it him back again.

DE CHALES (Claudius Francis Milliet), an excellent mathematician, mechanic, and aſtronomer, deſcended from a noble family, and born at Chamberry in 1611. His principal performances are an edition of Euclid's elements of geometry, in which the unſerviceable propoſitions are rejected, and the uſes of thoſe retained, annexed; a diſcourſe on fortification; and another on navigation. Theſe with others have been collected, firſt in 3 vols folio, and afterwards in 4, under the title of *Mundus Mathematicus:* being indeed a complete courſe of mathematics. He died in 1678, profeſſor of mathematics in the univerſity of Turin.

DECIDUOUS, an appellation chiefly uſed in reſpect of plants: thus, the calix or cup of a flower is ſaid to be *deciduous*, when it falls along with the flower-petals; and, on the contrary, it is called *permanent*, when it remains after they are fallen. Again, deciduous leaves are thoſe which fall in autumn; in contradiſtinction to thoſe of the ever-greens, which remain all the winter. See DEFOLIATION.

DECIL, in aſtronomy, an aſpect or poſition of two planets, when they are diſtant from each other a tenth part of the zodiac.

DECIMAL ARITHMETIC, the art of computing by decimal fractions. See ARITHMETIC.

DECIMATION, a puniſhment inflicted by the Romans, on ſuch ſoldiers as quitted their poſts, or behaved themſelves cowardly in the field. The names of the guilty were put into an urn or helmet, and as many were drawn out as made the tenth part of the whole number, and theſe were put to the ſword and the others ſaved. This was called *decimare;* a word of the ancient Roman militia, who, to puniſh whole legions, when they had failed in their duty, made every tenth ſoldier draw lots, and put him to death for an example to the others.

As the Romans had their decimatio, they had alſo the viceſimatio, and even centeſimatio, when only the 20th or 100th man ſuffered by lot.

DECIPHERING, the art of finding the alphabet of a cipher. For the art both of Ciphering and Deciphering, ſee the article CIPHER.

DECIUS (Publius), the Roman conſul, and brave general, memorable for devoting himſelf for his country, in a battle with the Latins 340 B. C. Decius Mus, his ſon, followed his father's example, as did a grandſon. The cuſtom was, that the officer who devoted himſelf to the gods for the ſervice of his country, after certain ceremonies of conſecration, ruſhed completely armed into the midſt of the enemy's foremoſt ranks, when their own deſpaired of victory: tho' this was an act of ſuperſtition which proved fatal to the hero, it reanimated his party, and occaſioned them to gain the battle. See DEVOTION.

DECIUS, the Roman emperor. He perſecuted the Chriſtians, which was accounted the 7th perſecution. At laſt he drowned himſelf in a marſh, that he might eſcape his enemies; who had killed his ſon, and defeated his army; A. D. 251.

DECK *of a* SHIP, (from *decken*, Dan. to cover); the planked floors of a ſhip, which connect the ſides together, and ſerve as different platforms to ſupport the artillery and lodge the men, as alſo to preſerve the cargo from the ſea in merchant-veſſels. As all ſhips are broader at the lower deck than on the next above it, and as the cannon thereof are always heavieſt, it is neceſſary that the frame of it ſhould be much ſtronger than that of the others; and for the ſame reaſon the ſecond or middle deck ought to be ſtronger than the upper deck or forecaſtle.

Ships of the firſt and ſecond rates are furniſhed with three whole decks, reaching from the ſtem to the ſtern, beſides a forecaſtle and a quarter-deck, which extends from the ſtern to the mainmaſt; between which and the forecaſtle a vacancy is left in the middle, opening to the upper deck, and forming what is called the *waiſt*. There is yet another deck above the hinder or aftmoſt part of the quarter-deck, called the *poop*, which alſo ſerves as a roof for the captain's cabin or couch.

The inferior ſhips of the line of battle are equipped with two decks and a half; and frigates, ſloops, &c. with one gun-deck and a half, with a ſpar-deck below to lodge the crew.

The decks are formed and ſuſtained by the beams, the clamps, the water-ways, the carlings, the ledges, the knees, and two rows of ſmall pillars called *ſtanchions*, &c. See thoſe articles.

That the figure of a deck, together with its correſponding parts, may be more clearly underſtood, we have exhibited a plan of the lower-deck of a 74 gun ſhip in Plate LXXXVIII. And as both ſides of the deck are exactly ſimilar, the pieces by which it is ſupported appear on one ſide, and on the other ſide the planks of the floor of which it is compoſed, as laid up on thoſe upper pieces.

A, the principal or main hatch-way.

B, the ſtern-poſt.

C, the ſtem.

D, the beams, compoſed of three pieces, as exhibited by D, in one of which the dotted lines ſhew the arrangement of one of the beams under the other ſide of the deck.

E, part of the vertical, or hanging knees.

F, the horizontal or lodging knees, which faſten the beams to the ſides.

G, the carlings ranging fore and aft, from one beam to another.

H, the gun-ports.

I, the pump-dales, being large wooden tubes, which return the water from the pumps into the ſea.

K, the ſpurs of the beams, being curved pieces of timber ſerving as half-beams to ſupport the decks, where a whole beam cannot be placed on account of the hatchways.

L, the wing-tranſom, which is bolted by the middle to the ſtern-poſt, and whoſe ends reſt upon the faſhion-pieces.

M, the bulk-head or partition, which incloſes the manger, and prevents the water which enters at the hawſe-holes from running aft between decks.

N N, the fore hatch-way.

O O, the after hatch-way.

P, the drum-head of the gear capſtern.

P p, the drum-head of the main capſtern.

Q, the wing-tranſom knee.

R, one of the breaſt-hooks under the gun-deck.

S, the breaſt-hook of the gun-deck.

T T, the ſtation of the chain-pumps.

V, the breadth and thickneſs of the timbers at the height of the gun-deck.

U U, ſcuttles leading to the gunner's ſtore-room, and the bread-room.

W, the ſtation of the fore-maſt.

X, the ſtation of the main-maſt.

Y, the ſtation of the mizen-maſt.

Z, the ring-bolts of the decks, uſed to retain the cannon whilſt charging.

a a, The ring-bolts of the ſides whereon the tackles are hooked that ſecure the cannon at ſea.

c a a d, The water-ways, through which the ſcupper holes are pierced, to carry the water off from the deck into the ſea.

b b, Plan of the foremoſt and aftmoſt cable-bits, with their croſs-pieces g g, and their ſtandards e e.

Thus we have repreſented on one ſide all the pieces which ſuſtain the deck with its cannon; and on the other ſide, the deck itſelf, with a tier of 32 pounders planted in battery thereon. In order alſo to ſhew the uſe of the breeching and train-tackle, one of the guns is drawn in as ready for charging.

The number of beams by which the decks of ſhips are ſupported, is often very different, according to the practice of different countries; the ſtrength of the timber of which the beams are framed; and the ſervices for which the ſhip is calculated.

As the deck which contains the train of a fire-ſhip is furniſhed with an equipage peculiar to itſelf, the whole apparatus is particularly deſcribed in the article FIRE-*Ship*.

Fluſh-DECK implies a continued floor laid from ſtem to ſtern, upon one line, without any ſtops or intervals.

Half-DECK, a ſpace under the quarter-deck of a ſhip of war, contained between the foremoſt bulk-head of the ſteerage, and the fore-part of the quarter-deck. In the colliers of Northumberland the ſteerage itſelf is called the *half-deck*, and is uſually the habitation of the crew.

DECLAMATION, a ſpeech made in public, in the tone and manner of an oration, uniting the expreſſion of action to the propriety of pronunciation, in order to give the ſentiment its full impreſſion upon the mind. According to the manners and cuſtoms of the preſent age, public harangues are made only, 1. In the pulpit. 2. In the ſenate, in council, or other public aſſembly. 4. By public profeſſors. 5. On the theatre.

I. With regard to the declamation of the pulpit, the dignity and ſanctity of the place, and the importance of the ſubject, require the preacher to exert the utmoſt powers of his voice to produce a pronunciation that is perfectly diſtinct and harmonious, and that he obſerve a deportment and action which is expreſſive and graceful. No man therefore, who is deſtitute of a voice, ſhould aſcend the pulpit, and there act the part of a pantomime before his audience. The preacher ſhould not, however, roar like a common cryer, and rend the ear with the voice of thunder; for ſuch kind of declamation is not only without meaning and without perſuaſion, but highly incongruous with the meek and gentle expreſſions of the goſpel. He ſhould likewiſe take particular care to avoid a monotony; his voice ſhould riſe from the beginning, as it were by degrees, and its greateſt ſtrength ſhould be exerted in the application. Each inflexion of the voice ſhould be adapted to the phraſe, and to the meaning of the words; and each remarkable expreſſion ſhould have its peculiar inflexion. The dogmatic requires a plain, uniform tone of voice only; and the menaces of the goſpel demand a greater force than do its promiſes and rewards: but the latter ſhould not be pronounced in the ſoft tone of a flute, nor the former with the loud ſound of a trumpet. The voice ſhould ſtill retain its natural tone in all its various inflexions. Happy is that preacher, to whom nature has given a voice that is at once ſtrong, flexible, and harmonious.

Bielfield's Elements.

An air of complacency and benevolence, as well as devotion, ſhould be conſtantly viſible in the countenance of the preacher. But every appearance of affectation muſt be carefully avoided: for nothing is ſo diſguſtful to an audience, as even the ſemblance of diſſimulation. Eyes conſtantly rolling, turned towards heaven, and ſtreaming with tears, rather denote a hypocrite, than a man poſſeſſed of the real ſpirit of religion, and that feels the true import of what he preaches. An air of affected devotion infallibly deſtroys the efficacy of all that the preacher can ſay, however juſt and important it may be. On the other hand, he muſt avoid every appearance of mirth or raillery, or of that cold unfeeling manner which is ſo apt to freeze the hearts of his hearers.

The body ſhould be in general erect, and in a natural and eaſy attitude. The perpetual movement, or contortion, of the body, has a ridiculous effect in the pulpit, and makes the figure of a preacher and a harlequin much too ſimilar. But, on the other hand, he ought not to remain conſtantly upright and motionleſs, like a ſpeaking ſtatue.

The motions of the hands give a ſtrong expreſſion to a diſcourſe; but they ſhould be conſtantly decent, grave, noble, and expreſſive. The preacher, who is inceſſantly in action, who is perpetually claſping his hands, or who menaces with a clenched fiſt, or counts his arguments on his fingers, will only excite mirth among his auditory. In a word, declamation is an art that the ſacred orator ſhould ſtudy with the utmoſt aſſiduity. The deſign of a ſermon is to convince, to affect, and to perſuade. The voice, the countenance, and the action, which are to produce this triple effect, are therefore the objects to which the preacher ſhould particularly apply himſelf.

II. The declamation of a miniſter or ſtateſman in the ſenate, in council, or other public aſſembly, is of a more unconfined nature. To perſuade, to move the paſſions, and gain an aſcendancy in a public aſſembly, the orator ſhould himſelf feel the force of what he ſays, and the declamation ſhould only expreſs that internal ſenſation. But nothing ſhould be carried to exceſs. A ſuavity in the tone of voice, a dignity of deportment, a graceful action, and a certain tranquillity of countenance, ſhould conſtantly accompany the ſtateſman when he ſpeaks in public, even when he is moſt earneſtly engaged in debate, or when he is addreſſing his ſovereign in perſon. A pleaſing tone of voice, and a diſtinct pronunciation, prejudice the hearers greatly in the ſpeaker's favour. A young man may improve theſe to a ſurpriſing degree. Demoſthenes, who had a natural impediment in his ſpeech, was accuſtomed to go to the ſea-ſhore, and partly filling his mouth with pebbles he declaimed with a loud voice. The ſtones by degrees gave a volubility to his tongue, and the roaring of the waves reconciled him inſenſibly to the noiſe of the multitude.

III. The principal object of a public profeſſor is the inſtruction of the ſtudious youth: for which purpoſe, he is to convince and perſuade. Every tone of voice, every expreſſion of the countenance, or action of the body, which can produce this effect by enforcing the words, ſhould therefore be employed by thoſe who are to teach the ſciences. There is, moreover, one very eſſential reflection which every profeſſor ought to make, and which is, that the chair, from which he harangues, is ſurrounded by young ſtudents, naturally poſſeſſed with vivacity, not infrequently ludicrous, and for the moſt part previouſly inſtructed in the preparatory ſciences. They are therefore conſtantly inclined to criticiſe, to jeſt, and to ridicule: for which reaſon, the profeſſor ſhould endeavour to inſpire them with reſpect and attention, by a grave, commanding, and venerable countenance; and carefully avoid all appearance of grimace in his action, and every kind of affectation in his diſcourſe, that he may not afford the leaſt opportunity for pleaſantry.

IV. We are now come to *theatric declamation*. 1. This was very different among the ancients from what it is, and ought to be, with us, from the nature of the thing itſelf, and from the difference of circumſtances. Numberleſs paſſages in Quintilian, and other ancient hiſtorians, critics, grammarians, and commentators, evidently prove, that the ancient dramatic declamation was ſubſervient to the rules of the muſical rhythmus: and by this, according to Ariſtides[*], their action, as well as recital, was regulated. But to explain this ſeeming paradox, it will be neceſſary to make here ſome preliminary remarks. The ancients gave a much more extenſive ſignification than we do to the word *muſic, (muſica)*, which they derived from the muſes, or at leaſt from ſome of them. It is for this reaſon, that the ſame Ariſtides and Quintilian define it to be "An art that teaches all that relates to the uſe of the voice, and the manner of performing all the motions of the body with grace:" *Ars decoris in vocibus & motibus*. Therefore poetry, declamation, dancing, pantomimes, and many other geſtures and exerciſes, were ſubſervient to this art.

2. That part of general muſic which taught the art of declamation and geſture according to the rules of an eſtabliſhed method, (and which we perform by inſtinct, or at moſt by the aid of common ſenſe), was diſtinguiſhed by the name of *hypocritic muſic:* and this muſical art was called, by the Greeks, *orcheſis*; and by the Romans, *ſaltatio*. It was, however, ſo far from being an advantage to the ancients to have had this art, which we have not, that it was, on the contrary, a mark of great imperfection: For, in the firſt place, it was an inſtance of high abſurdity to repreſent a tragedy, or comedy, before an audience of twenty thouſand people, the far greateſt part of whom could neither hear nor ſee what paſſed to any good purpoſe, unleſs they were poſſeſſed of organs which we have not. The theatres of London and Paris may conveniently contain about a thouſand perſons; and that is found ſufficient in the moſt populous cities, where there are ſeveral places of entertainment on the ſame day, and where the people are reaſonable enough to ſucceed each other in their diverſions. As the features of the face could not be diſtinguiſhed at ſo great a diſtance, and ſtill leſs the alteration of countenance in order to repreſent the different paſſions, they were obliged to have recourſe to *maſks*; a wretched, childiſh invention, that deſtroyed all the ſtrength and variety of expreſſion. Their action became extravagant; and, at the ſame time, ſubſervient to a regular mechaniſm, which prevented all the refinement, and all the pleaſure of ſurpriſe, in the performance; and muſt have had an effect horribly diſagreeable to thoſe who were placed near the ſtage.

3. The egregious imperfection of their language likewiſe, which conſiſted of ſyllables long and ſhort, whoſe duration was determined by a ſet meaſure of time, and their manner of tuning theſe ſyllables, after the method of the orcheſis of the Greeks, was another diſadvantage. For by this means they determined by notes or characters placed after the long and ſhort ſyllables, not only the nature, but the duration, of each action. Now, nothing could be more affected, more conſtrained and diſguſtful, than ſuch method of declaiming. How far ſuperior in this reſpect are the moderns, who conſult nature alone in their theatric declamation; who can make the audience hear each ſigh; who can accompany it with a proper attitude; who can inceſſantly vary their action; who can ſeize the lucky moment, and make the countenance fully expreſs the ſenſations of the mind? Nature does all here; and art, infinitely inferior to nature, did all among the ancients. Modern declamation cannot be ſubſervient to a muſical rhythmus, ſeeing we ſpeak rapidly, and without affectation. Our actors learn their art without art, from nature itſelf, aſſiſted by reflection; and they arrive at a degree of excellence infinitely greater than that of the ancients, by a method far more ſimple, and by efforts incomparably more eaſy.

4. We do not, moreover, preciſely know what the theatric declamation of the ancients was; nor what were the muſical inſtruments which accompanied that declamation. The title to the Eunuch of Terence ſays, for example, "That Flaccus, the freedman of Claudius, made the muſic of that piece, in which he employed the two flutes, the right and the left." Theſe flutes, it is likely, gave the tone to the actor; which muſt have had a very odd effect on the audience. Moſt of the ancient pieces have ſimilar titles. They who would be particularly informed of the art of declaiming among the Greeks and Romans, may read to advantage the Critical Reflections on Poetry and Pain-

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[*] *De muſica*, lib. 1.

ting by the Abbé du Bos. The third part of that work conſiſts entirely of learned reſearches, and ingenious reflections, on this ſilly practice of the ancients. But as this art has happily no place in modern declamation, and can at beſt ſerve only to make a parade of erudition, we ſhall ſay no more of it, but paſs to matters of real utility.

5. We think there is good reaſon to believe, moreover, that the moſt poliſhed nations of modern Europe do not accompany their diſcourſes, in general, with ſo many geſticulations, as did the Greeks, the Romans, and other inhabitants of warm climates. They appear to have found the method of animating a diſcourſe, and giving it an expreſſion, by the ſimple inflexions of the voice, and by the features of the countenance; which is far more decent, more juſt, and rational, than all thoſe contortions which perpetually derange the natural attitude of the body and its members, and give the ſpeaker the air of a harlequin.

6. *Expreſſion*, therefore, forms at once the eſſence and the end of declamation; and the means of producing it conſiſts in a pronunciation that is ſonorous, diſtinct, and pleaſing, ſupported by an action that is decent and proper to the ſubject. If the beſt dramatic poet has need of a good declaimer or actor to make his writing produce its proper effect, the actor has likewiſe need of a good poet to enable him to pleaſe and affect by his action: for it is to little purpoſe that he endeavours to charm his auditory by uniting, with nature, all the powers of art, if the poet has not furniſhed him with ſentiments that are rational and affecting.

7. The actor, in ſtudying his part before a large mirror, where he can ſee his whole figure, in order to determine the moſt proper expreſſion for every thought, ſhould conſult nature, and endeavour to imitate her. But, in this imitation, he ſhould take care not to make too ſervile a copy. He has this to obſerve, in common with his colleagues, the maſters in all the polite arts: The theatre is intended to exhibit an imitation of nature, and not nature itſelf. Tragedy and comedy form pictures of human life; but theſe pictures are alſo pieces of perſpective, which require ſtrokes ſomewhat ſtronger than nature, that they may be diſcerned at a diſtance. The actor is elevated to a conſiderable height from the ground; he is ſurrounded by ſcenery, he is ſeparated from the audience by the orcheſtra, and he ſpeaks in verſe; all this is not natural: but the ſpectator is to accede to this neceſſary illuſion, in order to promote his own pleaſure, which would not be ſo great as it is were all theſe matters otherwiſe diſpoſed. Declamation, therefore, ſhould ſomewhat exceed, but never loſe ſight of, nature.

8. The tone of the actor's voice ſhould be natural, but regulated by the extent of the theatre; ſufficiently loud to be heard by all the audience, but not ſo violent as to rend their ears. A pure and graceful pronunciation, without any provincial accent, is likewiſe a great merit in an actor; and he ſhould alſo habituate himſelf to ſpeak in a manner perfectly diſtinct. It is a capital point in the pronouncing of verſe, not to ſeparate the two hemiſtics, by reſting too long on the *cæſura* in the middle, or dwelling on the end of each hemiſtic: for, by ſo doing, the actor falls into a monotony, an inſufferable uniformity of cadence, in a piece that conſiſts of ſome thouſand verſes. The gradations of the voice demand alſo a very judicious obſervance. The ſpeaker, who begins in a high tone, will find it very difficult to ſuſtain it through the whole piece; and he, who clamours inceſſantly, will find his lungs fail him in thoſe parts where the vehemence of paſſion requires the ſtrongeſt efforts. If we may be allowed the expreſſion, the ſtrongeſt touches, the boldeſt figures, will not there ſtand out from the picture in a ſtriking manner.

9. The deportment of an actor ſhould be conſtantly graceful, decent, and proper to the character he repreſents. An old man has a different poſition of body from a young petit maitre; an aged queen from a young princeſs; a noble gallant from a valet de chambre. A rational obſervance of nature, and an imitation of the beſt actors, are here the ſureſt guides. The ſame may be ſaid of the action of the hands, the theatric ſtep, &c. An inanimated figure, a body in the poſition of a ſtatue, and hands immoveable, are as diſpleaſing in the ſcene, as a player whoſe inceſſant geſticulation reſembles the action of a puppet.

10. Every actor who aſpires to make his art ſomething more than merely mechanical, will begin by enabling himſelf readily to repeat his part, that the defect of his memory may not embarraſs his action. When he is ſo far a maſter of it, he will make it the ſubject of ſerious reflection in his cloſet; endeavour to ſeize the true ſenſe of the author; and to find out that expreſſion of each ſentiment and paſſion, which is the moſt natural, the moſt ſtriking, and beſt adapted to the ſtage; and which he will cultivate by repeated eſſays, till he is able to render it in its full force.

DECLARATORY ACTION. See LAW, N° clxxxii. 21.

DECLENSION, in grammar, an inflection of nouns according to their divers caſes; as nominative, genitive, dative, &c. See GRAMMAR.

DECLINATION, in aſtronomy, the diſtance of any celeſtial object from the equinoctial, either northward or ſouthward. It is either true or apparent, according as the real or apparent place of the object is conſidered. See ASTRONOMY, n° 210, 211.

DECLINATION *of the Sea-Compaſs* or *Needle*, is its variation from the true meridian of any place.

DECLINATION *of a Wall*, or *Plane, for Dials*, is an arch of the horizon, contained either between the plane and the prime vertical circle, if you reckon it from the eaſt or weſt; or elſe between the meridian and the plane, if you account it from the north or ſouth. See DIAL.

DECLINATORIES, are inſtruments for taking the declinations, inclinations, and reclinations of planes; and they are of ſeveral kinds.

The beſt ſort for taking the declination conſiſts of a ſquare piece of braſs, or wood, with a limb accurately divided into degrees; and every fifth minute, if poſſible, having a horizontal dial moving on the centre, made for the latitude of the place it is to ſerve in; and which has a ſmall bit of fine braſs fixed on its meridian line, like a fiducial edge, to cut the degrees of the limb: for at any time when the ſun ſhines, by having the hour of the day, you may find the declination of any wall or plane by this inſtrument.

DECLINATURE *of* JUDGES. See LAW, N° clvi. 12.

DECLIVITY denotes the reverſe of ACCLIVITY.

DECOCTION, uſually ſignifies either the action of boiling a ſubſtance in water, or the water itſelf in which the ſubſtance has been boiled. It is only applicable to matters containing ſome principles ſoluble in water; ſuch particularly are animal and vegetable matters. Decoction ought not to be uſed with ſuch ſubſtances as contain any volatile principles, as they would be diſſipated in the air during the proceſs. But it may be ſafely uſed, nay even becomes neceſſary, when the matters to be treated are ſolid, and of a cloſe and compact texture; becauſe then the water could not extract its principles without a boiling heat. Moſt ſoft animal matters, as fleſh, ſkin, tendons, may be conveniently boiled in water; becauſe they contain no principle volatile with a boiling heat. Water extracts from them nothing but a gelatinous ſubſtance, and ſome oily parts which float on the ſurface of the water. All vegetable matters which are inodorous, and particularly thoſe which are hard, as roots, barks, &c. are generally boiled, when an extraction of their principles by water is required.—To this rule, however, there are ſome exceptions. Peruvian bark, for inſtance, gives its ſtrength to cold water better than to ſuch as is boiling hot. Many other vegetables alſo have the ſame property of yielding leſs to boiling than to cold water. And therefore a general rule may be eſtabliſhed, that decoction ought not to be employed but when abſolutely neceſſary; that is, when the ſame principles, or the ſame quantities of thoſe principles, cannot be obtained by an infuſion, and that without heat, if it can be ſo done, conſidering that the proximate principles of vegetables are generally ſo delicate, and ſo ſuſceptible of change and decompoſition, that frequently the moſt gentle heat changes much their nature and properties.

DECOLLATION, BEHEADING, a term ſeldom uſed but in the phraſe *decollation* of St John Baptiſt; which denotes a painting, wherein is repreſented the Baptiſt's head, ſtruck off from his trunk; or the feaſt held in honour of that martyr.

DECOMPOSITION, in chemiſtry, uſually ſignifies the diſunion or ſeparation of the conſtituent parts of bodies.—It differs from mere mechanical diviſion, in that when a body is chemically decompoſed, the parts into which it is reſolved are eſſentially different from the body itſelf; but though a mechanical force is applied to it ever ſo long, or with ever ſo much violence, the minuteſt particles into which the body may be reduced, ſtill retain their original nature.—Thus, for example, though we ſuppoſe nitre, or any other ſalt, to be reduced to ever ſo fine powder, each particle retains the nature of nitre, as much as the largeſt unpounded maſs; but if oil of vitriol is applied, a decompoſition takes place, and one of the component parts of the nitre riſes in the form of a ſmoking acid ſpirit, which never could have been ſuſpected to lie hid in the mild neutral ſalt.

DECORATION, in architecture, any thing that adorns and enriches a building, church, triumphal arch, or the like, either without ſide or within.

The orders of architecture contribute greatly to the decoration: but then the ſeveral parts of thoſe orders muſt have their juſt proportions, characters, and ornaments; otherwiſe the fineſt order will bring confuſion rather than richneſs. See ARCHITECTURE.

Decorations in churches, are paintings, vaſes, feſtoons, &c. occaſionally applied to the walls; and with ſo much conduct and diſcretion, as not to take off any thing from the form of the architecture: as is much practiſed in Italy, at the ſolemn feaſts.

DECORATION is more particularly applied to the ſcenes of theatres.

In operas, and other theatrical performances, the decorations muſt be frequently changed conformably to the ſubject.

The ancients had two kinds of decorations for their theatres: the firſt, called *verſatiles*, having three ſides, or faces, which were turned ſucceſſively to the ſpectators: the other called *ductiles*, ſhewing a new decoration by drawing or ſliding another before it.—This latter ſort is ſtill uſed, and apparently with much greater ſucceſs than among the ancients, who were obliged to draw a curtain whenever they made a change in the decoration; whereas on our ſtage the change is made in a moment, and almoſt without being perceived.

DECORUM, in architecture, is the ſuitableneſs of a building, and the ſeveral parts and ornaments thereof, to the ſtation and occaſion.

DECOUPLE, in heraldry, the ſame as uncoupled: thus a chevron decouple, is a chevron wanting ſo much of it towards the point, that the two ends ſtand at a diſtance from one another, being parted and uncoupled.

DECOY, in naval affairs, a ſtatagem employed by a ſmall ſhip of war to betray a veſſel of inferior force into an uncautious purſuit, till ſhe has drawn her within the range of her cannon, or what is called within *gunſhot*. It is uſually performed by painting the ſtern and ſides in ſuch a manner as to diſguiſe the ſhip, and repreſent her either much ſmaller and of inferior force, or as a friend to the hoſtile veſſel, which ſhe endeavours to enſnare, by aſſuming the emblems and ornaments of the nation to which the ſtranger is ſuppoſed to belong. When ſhe has thus provoked the adverſary to chaſe, in hopes of acquiring a prize, ſhe continues the decoy by ſpreading a great ſail, as endeavouring to eſcape; at the ſame time that her courſe is conſiderably retarded by an artful alteration of her trim, till the enemy approaches. Decoying is alſo performed to elude the chaſe of a ſhip of a ſuperior force in a dark night, by throwing out a lighted caſk of pitch into the ſea, which will burn for a conſiderable time and miſguide the enemy. Immediately after the caſk is thrown out, the ſhip changes her courſe, and may eaſily eſcape if at any tolerable diſtance from the foe.

DECOY, among fowlers, a place made for catching wild-fowl. A decoy is generally made where there is a large pond ſurrounded with wood, and beyond that a marſhy and uncultivated country: if the piece of water is not thus ſurrounded, it will be attended with the noiſe and other accidents which may be expected to frighten the wild-fowl from a quiet haunt, where they mean to ſleep, during the day-time, in ſecurity. If theſe noiſes or diſturbances are wilful, it hath been held that an action will lie againſt the diſturber.—As ſoon as the evening ſets in, the decoy *riſes* (as they term it), and the wild fowl feed during the night. If the evening is ſtill, the noiſe of their wings, during their flight, is heard at a very great diſtances, and is a

Decoy. pleaſing though rather melancholy ſound. This *riſing* of the decoy in the evening, is in Somerſetſhire called *radding*.

The decoy-ducks are fed with hempſeed, which is thrown over the ſkreens in ſmall quantities, to bring them forwards into the pipes, and to allure the wild-fowl to follow, as this ſeed is ſo light as to float.

There are ſeveral *pipes*, as they are called, which lead up a narrow ditch that cloſes at laſt with a funnel-net. Over theſe pipes, (which grow narrower from their firſt entrance), is a continued arch of netting ſuſpended on hoops. It is neceſſary to have a pipe or ditch for almoſt every wind that can blow, as upon this circumſtance it depends which pipe the fowl will take to; and the decoy-man always keeps on the lee-ward ſide of the ducks, to prevent his effluvia reaching their ſagacious noſtrils. All along each pipe at certain intervals, are placed ſkreens made of reeds, which are ſo ſituated, that it is impoſſible the wild-fowl ſhould ſee the decoy-man, before they have paſſed on towards the end of the pipe, where the purſe-net is placed. The inducement to the wild-fowl to go up one of theſe pipes is, becauſe the decoy-ducks trained to this, lead the way, either after hearing the whiſtle of the decoy-man, or enticed by the hempſeed; the latter will dive under water, whilſt the wild-fowl fly on, and are taken in the purſe.

It often happens, however, that the wild-fowl are in ſuch a ſtate of ſleepineſs and dozing, that they will not follow the decoy-ducks. Uſe is then generally made of a dog, who is taught his leſſon: he paſſes backwards and forwards between the reed-ſkreens, (in which are little holes, both for the decoy-man to ſee, and the little dog to paſs through); this attracts the eye of the wild-fowl, who, not chooſing to be interrupted, advance towards the ſmall and contemptible animal, that they may drive him away. The dog all the time, by the direction of the decoy-man, plays among the ſkreens of reeds, nearer and nearer the purſe-net; till, at laſt, perhaps, the decoy-man appears behind a ſkreen, and the wild-fowl not daring to paſs by him in return, nor being able to eſcape upwards on account of the net-covering, ruſh on into the purſe-net. Sometimes the dog will not attract their attention, if a red handkerchief, or ſomething very ſingular, is not put about him.

The general ſeaſon for catching fowl in decoys, is from the latter end of October till February: the taking of them earlier is prohibited by an act 10 *Geo. II. c.* 32. which forbids it from June 1ſt to October 1ſt, under the penalty of five ſhillings for each bird deſtroyed within that ſpace.

The Lincolnſhire decoys are commonly ſet at a certain annualrent, from 5 to 20 pounds a-year: and there is one in Somerſetſhire that pays 30 *l.* The former contribute principally to ſupply the markets in London. Amazing numbers of ducks, wigeons, and teal, are taken: by an account ſent us * of the number caught a few winters paſt, in one ſeaſon, and in only ten decoys, in the neighbourhood of Wain-fleet, it appeared to amount to 31,200, in which are included ſeveral other ſpecies of ducks: it is alſo to be obſerved, that, in the above particular, wigeon and teal are reckoned but as one, and conſequently ſell but at half price of the ducks. This quantity makes them ſo cheap on the ſpot, that we have been aſſured, ſeveral decoy-men would be content to contract for years to deliver their ducks at Boſton, for 10 *d.* per couple. The account of the numbers here mentioned, relates only to thoſe that were ſent to the capital.

It was cuſtomary formerly to have in the fenns an annual *driving* of the young ducks before they took wing. Numbers of people aſſembled, who beat a vaſt tract, and forced the birds into a net placed at the ſpot where the ſport was to terminate. A hundred and fifty dozens have been taken at once: but this practice being ſuppoſed to be detrimental, has been aboliſhed by act of parliament.

DECREE, an order made by a ſuperior power for the regulation of an inferior.

Decree, in the civil law, is a determination which the emperor pronounces upon hearing a particular cauſe between the plaintiff and defendant.

Decrees *of Councils*, are the laws made by them, to regulate the doctrine and policy of the church.

Decrees *in Chancery*, are the determination of the lord-chancellor, upon a full hearing of the merits of a cauſe.

DECREET, in the law of Scotland, a final decree or judgment of the lords of ſeſſion, from which an appeal only lies to parliament.

Decreet-*Arbitral*, in Scots law, the ſentence or judgment of one to whom parties voluntarily ſubmit the determination of any queſtion betwixt them *.

DECREMENT, in heraldry, ſignifies the wane of the moon from the full to the new. The moon in this ſtate is called *moon decreſcent*, or in *decours;* and when borne in coat-armour, faces to the left ſide of the eſcutcheon, as ſhe does to the right ſide when in the increment.

DECREPITATION, in chemiſtry, ſignifies the quick ſeparation of the parts of a body, occaſioned by a ſtrong heat, and accompanied with noiſe and crackling. This effect is moſt frequently produced by water contained betwixt the parts of the decrepitating body, when theſe parts have a certain degree of adheſion together. This water being quickly reduced into vapours by the heat ſuddenly applied to it, rarifies, and burſts with noiſe the parts which compreſs it. The bodies moſt ſubject to decrepitation are certain ſalts, ſuch as common ſalt, vitriolated tartar, nitre of lead, &c. the decrepitation of all which proceeds from the water of their cryſtallization. Clays which are not perfectly dry, and flints, are alſo ſubject to decrepitation.

DECRETAL, in the canon law, a letter of a Pope determining ſome point or queſtion in the eccleſiaſtical law. The decretals compoſe the ſecond part of the canon law. The firſt genuine one, acknowledged by all the learned as ſuch, is a letter of Pope Siricius, written in the year 385, to Himerus biſhop of Tarragona, in Spain, concerning ſome diſorders which had crept into the churches of Spain. Gratian publiſhed a collection of decretals, containing all the ordinances made by the Popes till the year 1150. Gregory IX. in 1227, following the example of Theodoſius and Juſtinian, formed a conſtitution of his own, collecting into one body all the deciſions and all the cauſes which ſerved to advance the papal power; which collection of decretals was called the *pentateuch*, becauſe it contains five books.

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nnant's it. Zool. 595.

* See *Law*, No clxxxv. 15.

DECUPLE proportion, that of ten to one.

DECURIO, in Roman antiquity, a commander of ten men in the army, or the chief of a decury.

DECURRENT leaf. See Botany, p. 1297.

DECURY, ten perſons ranged under one chief, or leader, called the *decurio*.

The Roman cavalry was divided into decuries, which were ſubdiviſions of a century, each century containing ten decuries.

DECUSSATION, a term in geometry, optics, and anatomy, ſignifying the croſſing of two lines, rays, or nerves, when they meet in a point, and then go on ſeparately from one another.

DECUSSORIUM, a ſurgeon's inſtrument, which, by preſſing gently on the dura mater, cauſes an evacuation of the pus collected between the cranium and the before-mentioned membrane, through the perforation made by the trepan.

DEDHAM, a town of Eſſex in England, conſiſting of about 400 lofty houſes. The ſtreets are not paved, but very clean, occaſioned by their lying pretty high. It has one large old church, remarkable for a fine Gothic ſteeple, with a great deal of carved work about it, but much injured by time. E. Long. 1. 10. N. Lat. 52. 5.

DEDICATION, the act of conſecrating a temple, altar, ſtatue, palace, &c. to the honour of ſome deity.

The uſe of dedications is very ancient both among the worſhippers of the true God, and among the heathens: the Hebrews call it חנכה *hhanuchah*, "imitation;" which the Greek tranſlators render Εγκαινια, and Εγκαινισμος, "renewing."

In the ſcripture we meet with dedications of the tabernacle, of altars, of the firſt and ſecond temple, and even of the houſes of private perſons. There are alſo dedications of veſſels, and garments of the prieſts and Levites, and even of the men themſelves.

The heathens had alſo dedications of temples, altars, and images of their gods, &c. Nebuchadnezzar held a ſolemn dedication of his ſtatute, *Dan.* iii. 2. Pilate dedicated gilt bucklers at Jeruſalem to Tiberius, *Philo de legat.* Petronius would have dedicated a ſtatue to the emperor in the ſame city, *ibid.* p. 791. Tacitus, *Hiſt.* lib. iv. c. 53. mentions the dedication of the capitol, upon rebuilding it by Veſpaſian, &c.

The Jews celebrated the anniverſary of the dedication of their temple every year for eight days. This was firſt enjoined by Judas Maccabeus, and the whole ſynagogue, in the year of the Syro-Macedonian Æra 148, *i. e.* 164 years before Chriſt. The heathens had the like anniverſaries, as that of the dedication of the temple of Parthenope, mentioned by Lycophron. Under Chriſtianity, dedication is only applied to a church; and is properly the conſecration thereof performed by a biſhop, with a number of ceremonies preſcribed by the church.

The Chriſtians finding themſelves at liberty under Conſtantine, in lieu of their ruinous churches, built new ones in every place; and dedicated them with a deal of ſolemnity. The dedication was uſually performed in a ſynod; at leaſt they aſſembled a number of biſhops to aſſiſt at the ſervice. We have the deſcription of thoſe of the churches at Jeruſalem and Tyre in Euſebius, and many others in later writers.

DEE (John), a famous mathematician and aſtrologer, was born (July 1527) in London, where his father was a wealthy vintner. In 1542, he was ſent to St John's college, Cambridge. After five years cloſe application to mathematical ſtudies, particularly aſtronomy, he went to Holland, in order to viſit ſeveral eminent mathematicians on the continent. Having continued abroad near a year, he returned to Cambridge; and was there elected one of the fellows of Trinity college, then firſt erected by king Henry VIII. In 1548, he took the degree of maſter of arts; and, in the ſame year, left England a ſecond time; his ſtay at home being rendered uneaſy to him, by the ſuſpicions that were entertained of his being a conjuror; ariſing partly from his application to aſtronomy, but eſpecially on account of a piece of machinery in the Ειρηνη of Ariſtophanes, which he exhibited to the univerſity, and in which he repreſented the Scarabeus flying up to Jupiter, with a man and a baſket of victuals on its back. Theſe ſuſpicions he could never after ſhake off: nor did his ſubſequent conduct, as we ſhall ſee, tend to clear him of the imputation; for if he was not actually a conjuror, it was not for want of endeavours.

Upon leaving England, he went to the univerſity of Louvain; where he was much eſteemed, and viſited by ſeveral perſons of high rank. Here he reſided about two years, and then ſet out for France; where, in the college of Rheims, he read lectures of Euclid's elements with vaſt applauſe. In 1551, he returned to England, and was introduced by the ſecretary Cecil to king Edward, who aſſigned him a penſion of 100 crowns, which he afterwards relinquiſhed for the rectory of Upton upon Severn: but ſoon after the acceſſion of queen Mary, having ſome correſpondence with the lady Elizabeth's ſervants, he was accuſed of practiſing againſt againſt the queen's life by enchantment. On this account he ſuffered a tedious confinement, and was ſeveral times examined; till, in the year 1555, he obtained his liberty by an order of council.

When queen Elizabeth aſcended the throne, our aſtrological Dee was conſulted by lord Dudley, concerning a propitious day for her majeſty's coronation. He was on this occaſion introduced to the queen, who made him great promiſes, which were never performed, though ſhe condeſcended to receive his inſtructions relative to the myſtical interpretation of ſome of his unintelligible writings, which he publiſhed about this time. In 1564, he made another voyage to the continent; in order to preſent a book which he had dedicated to the emperor Maximilian. He returned to England in the ſame year; but in 1571, we find him in Lorain; where, being dangerouſly ill, the queen ſent over two phyſicians to his relief. Having once more returned to his native country, he ſettled at Mortlake in Surrey, where he continued his ſtudies with unremitting ardor, and collected a conſiderable library of curious books and manuſcripts, with a variety of inſtruments; moſt of which were afterwards deſtroyed by the mob, as belonging to one who dealt with the devil. In 1578, the queen being much indiſpoſed, Mr Dee was ſent abroad to conſult with German phyſicians and philoſophers (aſtrologers no doubt) on the occaſion. We now behold him again in England, where he was ſoon after employed in a more rational ſervice. Her majeſty, deſirous to be informed concerning her title to thoſe countries which had been diſcovered by her ſubjects,

jects, commanded Mr Dee to conſult the ancient records, and furniſh her with proper geographical deſcriptions. Accordingly, in a ſhort time he preſented to the queen, in the gardens at Richmond, two large rolls, in which the diſcovered countries were geographically deſcribed and hiſtorically illuſtrated. Theſe rolls are preſerved in the Cotton library, *Auguſtus* I. His next employment was the reformation of the calendar, on which ſubject he wrote a rational and learned treatiſe, preſerved in the Aſhmolean library at Oxford.

Hitherto the extravagancies of our eccentrical philoſopher ſeem to have been counterpoiſed by a tolerable proportion of reaſon and ſcience; but henceforward we conſider him as a mere necromancer, and credulous alchymiſt. In the year 1581, he became acquainted with one Edward Kelley, by whoſe aſſiſtance he performed diverſe incantations, and maintained a frequent imaginary intercourſe with ſpirits. He was particularly intimate, it ſeems, with the angels Raphael and Gabriel. One of them made him a preſent of a black ſpeculum, in which his angels and demons appeared as often as he had occaſion for them; they anſwered his queſtions, and Kelley's buſineſs was to record their dictates:

> Kelly did all his feats upon
> The devil's looking-glaſs, a ſtone.
> HUDIB. *part* ii. *cant.* iii. *v.* 631.

In 1583, they were both introduced to a certain Poliſh nobleman, then in England, named *Albert Laſki*, palatine of Siradia, a perſon equally addicted to the ſame ridiculous purſuits. He was ſo charmed with Dee and his companion, that he perſuaded them to accompany him to his native country. They embarked for Holland in Sept. 1583; and travelling over land, arrived at the town of Laſki, in February following. Their patron, however, finding himſelf abuſed by their idle pretenſions, perſuaded them to pay a viſit to Rodolph king of Bohemia; who, tho' a credulous man, was ſoon diſguſted with their nonſenſe. They were afterwards introduced to the king of Poland, but with no better ſucceſs. Soon after this, they were invited by a rich Bohemian nobleman, to his caſtle of Trebona, where they continued for ſome time in great affluence; owing, as they aſſerted, to their art of tranſmutation by means of a certain powder in the poſſeſſion of Kelly.

Dee, now quarrelling with his companion in iniquity, quitted Bohemia, and returned to England, where he was once more graciouſly received by the queen; who, in 1595, made him warden of Mancheſter college, in which town he reſided ſeveral years. In 1604, he returned to his houſe at Mortlake, where he died in the year 1608, aged 81; leaving a large family, and many works, behind him.—The black ſtone into which Dee uſed to call his ſpirits, was in the collection of the earls of Peterborough, whence it came to lady Elizabeth Germaine. It was next the property of the late duke of Argyle, and is now Mr Walpole's. It appears upon examination to be nothing but a poliſhed piece of cannel-coal.—That Dee was a man of conſiderable acquirements, is beyond a doubt; his mathematical knowledge is generally allowed: but, unleſs we ſuppoſe him a wicked impoſtor, which is by no means improbable, we muſt tranſmit him to poſterity as one of the moſt fooliſh, ſuperſtitious, necromancers of his time. Nevertheleſs, the celebrated Dr Hook, many years after Dee's death, took it into his head to prove that his journal, publiſhed by Caſaubon, was entirely cryptographical, concealing his political tranſactions, and that he was employed by queen Elizabeth as a ſpy.

DEE, the name of ſeveral rivers in Scotland and England; as thoſe whereon the cities of Cheſter in England, and New Aberdeen in Scotland, are ſituated.

DEED, an inſtrument written on paper or parchment, comprehending ſome contract, bargain or agreement between the parties thereto, in relation to the matter therein contained.

DEEMSTERS, or DEMSTERS; (from the Saxon *dema*, judge or umpire). All controverſies in the Iſle of Man are decided without proceſs, writings, or any charges, by certain judges, choſen yearly from among themſelves, called *deemſters*; there being two of them for each diviſion of the iſland: they ſit judges in all courts, either for life or property; and with the advice of 24 keys, declare what is law in uncommon emergencies.

DEEPING, a town of Lincolnſhire in England, ſeated on the river Weland, in a fenny ground. W. Long. 0. 20. N. Lat. 52. 35.

DEER, in zoology. See CERVUS.—The method of hunting deer in the iſland of Ceylon, is very particular. The huntſmen go out in the night, and only two uſually go together: the one of theſe carries upon his head an earthen veſſel, in which there is ſome fire burning and flaming; the ingredients are generally ſmall ſticks cut into pieces, and common roſin. Of this the other man carries a ſupply about him to repleniſh the pot when it grows low. The perſon who has the fire upon his head, carries in one hand a ſtaff, on which there are fixed eight bells; and the larger theſe are, the better. This man goes firſt into the woods, and the other follows cloſe behind with a ſpear in his hand. As ſoon as the deer hears the noiſe of the bells, he turns towards the place whence the ſound comes; and ſeeing the fire, he eagerly runs up to it, and ſtands gazing at a ſmall diſtance: the ſecond man has then nothing to do but to kill him with the ſpear; for he ſees neither of them.—Not only deer, but even elks and hares, are thus taken; for they gaze at the fire, and never ſee the men. The profits of this ſort of hunting are very large, and the danger nothing; for tho' there are numbers of tygers, elephants, and wild boars, in theſe woods, the huntſmen are in no danger from them while the fire burns, for they all run away from it.

DE FACTO, ſomething actually in fact, or exiſting; in contradiſtinction to *de jure*, where a thing is only ſo in juſtice, but not in fact: as a king *de facto*, is a perſon who is actually in poſſeſſion of a crown, but has no legal right to the ſame; and a king *de jure*, is the perſon who has a juſt right to the crown, though he is out of poſſeſſion thereof.

DEFAMATION, the ſpeaking ſlanderous words of another; for which the ſlanderer is puniſhable, according to the nature of his offence, either by action upon the caſe at common law, or by ſtatute in the eccleſiaſtical court.

DEFAULT, in law, is generally taken for non-appearance in court, at a day aſſigned; but imports any omiſſion of that which we ought to do, for which judgment may be given againſt the defaulter.

DEFEASANCE. See Defeisance.

DEFECATE, or Defæcate, in chemiſtry, a term applied to a body freed and purged from fæces and impurities.

DEFECTION, the act of abandoning or relinquiſhing a party or intereſt a perſon had been engaged in.—The word is formed of the Latin *deficio*, to fall of.

DEFECTIVE, in general, an appellation given to things which want ſome of the properties that naturally they ought to have. Thus,

Defective or *Deficient Nouns*, in grammar, are ſuch as want either a whole number, a particular caſe, or are totally indeclinable. See Noun.

The term *defective* is alſo applied to a verb that has not all its moods and tenſes. See Verb, Mood, &c.

DEFEISANCE, in law, a condition relating to ſome certain deed, which being performed, the deed is defeated and rendered void, as if it had never been made.

DEFENCE, in fortification, all ſorts of works that cover and defend the oppoſite poſts, as flanks, caſements, parapets, and fauſſebrays. See Fortification.

Line of Defence, a ſuppoſed line drawn from the angle of the curtin, or from any other part in the curtin, to the flanked angle of the oppoſite baſtion.

DEFEND, in general, ſignifies much the ſame with *protecting*, or keeping off injuries offered to any perſon either by enemies or otherwiſe.

Defend, in our ancient laws and ſtatutes, ſignifies to prohibit or forbid: as, *Uſuarios* defendit *quoque rex Edwardus ne remanerent in regno*. L. L. Edw. Conf. *c.* 37. *&* 5 Rich. 2. *c.* 7. In which ſenſe Chaucer alſo uſes it in the following paſſage:

"Where can you ſay in any manner age,
"That ever God *defended* marriage."

In 7 Edw. I. there is a ſtatute, intitled, "*Statutum de* defenſione *portandi arma*," &c. And "it is *defended* by law to diſtrain on the highway;" *Coke on Littl.* fol. 161.

DEFENDANT, in law, the perſon ſued in an action perſonal; as *tenant* is he who is ſued in an action real. See Action.

DEFENDERS, were anciently notable dignitaries both in church and ſtate, whoſe buſineſs was to look to the preſervation of the public weal, to protect the poor and helpleſs, and to maintain the intereſts and cauſes of churches and religious houſes. See Protector.—The council of Chalcedon, can. 2. calls the *defender* of a church Εκδικος. Codin, *de officiis aulæ Conſt.* makes mention of *defenders* of the palace. There were alſo a defender of the kingdom, *defenſor regni*; defenders of cities, *defenſores civitatis*; defenders of the people, *defenſores plebis*; of the poor, fatherleſs, widows, &c.

About the year 420, each patriarchal church began to have its defender; which cuſtom was afterwards introduced into other churches, and continued to later days under other names; as thoſe of *Advocate*, and *Advouee*.

In the year 407, we find the council of Carthage aſking the emperor for defenders, of the number of *Scholaſtici*, i. e. advocates who were in office; and that it might be allowed them to enter and ſearch the cabinets and papers of the judges and other civil magiſtrates, whenever it ſhould be found neceſſary for the intereſt of the church. The emperor ſtill retains the quality of advocate of the church; and the kings of Great Britain preſerve the title of *Defender of the Faith*, granted to Henry VIII. by pope Leo X. in 1521, on occaſion of that prince's writing againſt Luther, and afterwards confirmed by Clement VII. Tho. Chamberlayne ſays, the title belonged to the kings of England before that time; and for proof hereof appeals to ſeveral charters granted to the univerſity of Oxford: So that pope Leo's bull was only a renovation of an ancient right. *Preſ. Stat. l.* 1. *c.* 2.

DEFILE, in fortification, a ſtraight narrow paſſage, through which a company of horſe or foot can paſs only in file, by making a ſmall front.

DEFINITE, in grammar, is applied to an article that has a preciſe determinate ſignification; ſuch as the article *the* in Engliſh, *le* and *la* in French, *&c.* which fix and aſcertain the noun they belong to, to ſome particular; as *the king*, *le roy*: whereas, in the quality *of king*, *de roy*, the articles *of* and *de* mark nothing preciſe, and are therefore indefinite.

DEFINITION, in general, a ſhort deſcription of a thing by its properties; or, in logic, the explication of the eſſence of a thing by its kind and difference. See Logic, n° 6,—24. 51, 52.

DEFINITIVE, a term applied to whatever terminates a proceſs, queſtion, *&c.*; in oppoſition to proviſional and interlocutory.

DEFLAGRATION, in chemiſtry, the kindling or ſetting fire to a ſalt or mineral, *&c.* either alone or mixed for that purpoſe with a ſulphureous one, in order to purify it. See Chemistry, n° 83.

This ſhort proceſs has been often recommended to the world as of great uſe in trying the ſtrength of brandies and other vinous ſpirits, and has been greatly improved in this reſpect by Mr Geoffroy.

The common way of trying ſpirits by deflagration, is to meaſure out any quantity of it, then to heat it, and ſet it on fire. If, after it will no longer burn, the remainder is half as much as the quantity meaſured out for the trial was, then the ſpirit tried is found to conſiſt of half water, and half totally inflammable ſpirit; that is, it is ſomewhat below what we underſtand by the term *perfect proof*.—This method is much more certain than that by the crown of bubbles which ariſes upon ſhaking the ſpirit in a vial. Monſ. Geoffroy's method is this: Take a cylindric veſſel two inches high, and as much in diameter, conſiſting of thin plate ſilver, that metal being much leſs liable to ruſt than copper; this veſſel muſt be fitted with a little rectangular gage exactly graduated into lines, half lines, &c. then the veſſel being ſet level upon a copper caſe made to contain it, a parcel of the brandy to be examined is poured in, to the height of 16 lines. This height is to be exactly hit by pouring in more than enough at firſt, and then ſucking out the overplus with a very ſmall tube. Then the veſſel being heated a little, ſo as juſt to make the liquor fume, it is to be ſet on fire, and left to go out of itſelf; at the inſtant when the flame expires, the gage is plunged perpendicularly into the veſſel, and the lines and quarters exactly noted which the liquor wants of its former height: this difference gives the preciſe quantity of alcohol or pure ſpirit contained in the liquor. Thus, if eight lines of phlegm are found remaining, this being the half of the 16 lines of the original filling, it is plain, that the liquor contained one half ſpirit, or was ſomething below proof. If only four lines remained, it was nearly double proof, or of a middle nature betwixt alcohol and common proof-ſpirit.

DEFLECTION *of the* Rays *of* Light, a property which Doctor Hook obſerved in 1675, and read an account of before the Royal Society, March 18, the ſame year. He ſays he found it different both from reflection and refraction, and that it was made towards the ſurface of the opaque body, perpendicularly. This is the ſame property which Sir Iſaac Newton calls *inflection*. See the article Inflection.

DEFLORATION, or Deflowering, the act of violating or taking away a woman's virginity. See Virginity.—Death, or marriage, are decreed by the civil law in caſe of defloration.

The ancients had ſo much reſpect for virgins, that they would not put them to death, till they had firſt procured them to be deflowered. It is ſaid, the natives of the coaſt of Malabar pay ſtrangers to come and deflower their brides.

In Scotland, and the northern parts of England, it was a privilege of the lords of the manor, granted them by king Ewen, that they ſhould have the firſt night's lodging with their tenants wives. King Malcolm III. allowed the tenants to redeem this ſervice at a certain rate, called *marcheta*, conſiſting of a certain number of cows: Buchanan ſays it was redeemed with half a mark of ſilver. The ſame cuſtom had place in Wales, Flanders, Friſeland, and ſome parts of Germany.

DEFLUXION, in medicine, the falling of the humours from a ſuperior to an inferior part of the body.

DE FOE (Daniel), a writer famous for politics and poetry, was bred a hoſier; which profeſſion however he ſoon forſook, and became one of the moſt enterpriſing authors that any age produced. When diſcontents ran high at the Revolution, and king William was obliged to diſmiſs his Dutch guards, De Foe, who had true notions of civil liberty, ridiculed the enemies of government in his well-known poem, called *The True-born Engliſhman*, which had a prodigious ſale. The next ſatire he wrote was intitled, *Reformation of Manners*; aimed at ſome perſons of high rank, who rendered themſelves a diſgrace to their country. When the eccleſiaſtics in power breathed too much of a ſpirit of perſecution, De Foe wrote a tract called *The Shorteſt way with the Diſſenters*; for which he was called to account, and explained himſelf with great firmneſs. He was afterward ſentenced to the pillory for attacking ſome public meaſures; which ſo little intimidated him, that, in defiance of their uſage, he wrote *A Hymn to the Pillory*. It would be endleſs to enumerate all his publications: but as he is perhaps beſt known for his admirable *Hiſtory of Robinſon Cruſoe*, it may be worth while to give the hiſtory of that work; which does the author of it no credit as to the better part of a writer's character, honeſty. When captain Woods Rogers touched at the iſland of Juan Fernandez, in the South Sea, he brought away Alexander Selkirk, a Scots ſailor, who had been left aſhore there, and had lived on that deſolate place above four years. When Selkirk came back to England, he wrote a narrative of his adventures, and put the papers into the hands of De Foe, to digeſt for publication; who ungenerouſly converted the materials into the Hiſtory of Robinſon Cruſoe, and returned Selkirk his papers again! A fraud for which, in a humane view, the diſtinguiſhed merit of that romance can never atone. Daniel de Foe died at Iſlington, in 1731.

DEFOLIATION, (from *de*, and *folium* a leaf); the fall of the leaves. A term oppoſed to *frondeſcentia*, the annual renovation of the leaves, produced by the unfolding of the buds in ſpring. See Frondescentia.

Moſt plants in cold and temperate climates ſhed their leaves every year: this happens in Autumn, and is generally announced by the flowering of the common meadow ſaffron. The term is only applied to trees and ſhrubs; for herbs periſh down to the root every year, loſing ſtem, leaves, and all.

All plants do not drop their leaves at the ſame time. Among large trees, the aſh and walnut, although lateſt in unfolding, are ſooneſt diveſted of them: the latter ſeldom carries its leaves above five months.

On the oak and horn-beam, the leaves die, and wither, as ſoon as the colds commence; but remain attached to the branches till they are puſhed off by the new ones, which unfold themſelves the following ſpring. Theſe trees are doubtleſs a kind of ever-greens: the leaves are probably deſtroyed only by cold; and perhaps would continue longer on the plant, but for the force of the ſpring-ſap, joined to the moiſture.

In mild and dry ſeaſons, the lilac, privet, yellow jeſſamine of the woods, and maple of Crete, preſerve their leaves green until ſpring, and do not drop them till the new leaves are beginning to appear. The fig-tree, and many other trees that grow between the tropics, are of this particular claſs of ever-greens. The trees in Egypt, ſays Doctor Haſſelquiſt, caſt their leaves in the latter end of December and beginning of January, having young leaves ready before all the old ones are fallen off; and, to forward this operation of nature, few of the trees have buds: the ſycamore and willow, indeed, have ſome, but with few and quite looſe *ſtipulæ* or ſcales. Nature did not imagine buds ſo neceſſary in the ſouthern as in the northern countries; this occaſions a great difference between them.

Laſtly, ſome trees and ſhrubs preſerve their leaves conſtantly through the whole year: and are not in the leaſt influenced by the clemency or inclemency of ſeaſons. Such are the firs, juniper, yew, cedar, cypreſs, and many other trees, hence denominated *ever-greens*. Theſe preſerve their old leaves a long time after the formation of the new, and do not drop them at any determinate time. In general, the leaves of ever-greens are harder, and leſs ſucculent, than thoſe which are renewed annually. The trees are generally natives of warm climates; as the alaternuſes of France and Italy, the ever-green oak of Portugal and Suabia.

Some herbaceous perennials, as the houſe-leeks and navel-worts, enjoy the ſame privilege with the evergreen trees, and reſiſt the ſeverities of winter: ſome even can diſpenſe with the earth for ſome time; being replete with juices, which the leaves imbibe from the humidity of the atmoſphere, and which, in ſuch plants, are, of themſelves, ſufficient for effecting the purpoſes of vegetation. It is for this reaſon, that, unleſs in exceſſive hot weather, gardeners are ſeldom wont to water fat ſucculent plants, as the aloes, which rot, when they are moiſtened, if the ſun does not quickly dry them up.

The leaves of all the ever-green ſhrubs and trees, have a thin compact ſkin, or cover, over their ſurface; as is eaſily diſcovered by macerating them in water, in order to ſeparate the parenchyma, or pulp, from the veſſels of the leaves; which cannot be effected in any of theſe ever-greens, till a thin parchment-like cover is taken off. Theſe trees and ſhrubs are found by experiment to perſpire but little, when compared with others which ſhed their leaves; and it is, perhaps, principally owing to this cloſe covering, as alſo to the ſmall proportion of moiſture contained in their veſſels, that they retain their verdure, and continue thro' the winter on the trees. The nutritive juices of theſe plants always abound, more or leſs, with an oily quality, which ſecures them from being injured by ſevere froſts; ſo that many of theſe ever-green trees are adapted to grow in the coldeſt parts of the habitable world.

With reſpect to deciduous trees, the falling off of the leaves ſeems principally to depend on the temperature of the atmoſphere, which likewiſe ſerves to haſten or retard the appearance in queſtion. An ardent ſun contributes to haſten the dropping of the leaves. Hence in hot and dry ſummers, the leaves of the lime-tree and horſe-cheſnut turn yellow about the firſt of September; whilſt in other years, the yellowneſs does not appear till the beginning of October. Nothing, however, contributes more to haſten the fall of the leaves, than immoderate cold or moiſt weather in autumn; moderate droughts, on the other hand, ſerve to retard it. As a proof of this poſition, Mr Adanſon relates, that in the year 1759, the leaves of the elm-tree, which generally fall off about the 25th of November, continued in verdure and vigour at Paris, where the autumn was remarkably dry, till the 10th of the following month.

The following table, reſpecting the mean times in which different trees ſhed their leaves, is founded upon obſervations.

Gooſeberry-tree, and bladder-ſena,	Generally quit their leaves about	October 1ſt.
Walnut and aſh,		——— 15th.
Almond-tree, horſe-cheſnut, and lime-tree,		——— 20th.
Maple, hazel-nut, black-poplar, and aſpen tree,		——— 25th.
Birch, plane-tree, mountain-oſier, falſe-acacia, pear, and apple-tree,		November 1ſt.
Vine, mulberry, fig, ſumac, and angelica-tree,		——— 10th.
Elm-tree, and willow,		——— 15th.
Apricot, and elder-trees,		——— 20th.

It deſerves to be remarked, that an ever-green tree grafted upon a deciduous, determines the latter to retain its leaves. This obſervation is confirmed by repeated experiments; particularly by grafting the laurel, or cherry-bay, an ever-green, on the common cherry; and the ilex, or ever-green oak, on the oak. *Milne's Bot. Dict.*

DEFORCEMENT, in law, the caſting any one out of his land, or with-holding of lands and tenements by force from the right owner.

Deforcement, in Scots law, the oppoſing or reſiſting of the officers of the law in the execution of their office. See Law, N° clxxxvi. 15.

DEFORMITY, the want of that uniformity neceſſary to conſtitute the beauty of an object *.

DEFOSSION, Defossio, the puniſhment of burying alive, inflicted among the Romans on veſtal virgins guilty of incontinency. It is alſo a cuſtom among the Hungarians to inflict this puniſhment on women convicted of adultery. Heretics were alſo puniſhed in this manner. See Burying-*Alive*.

DEGENERATION, or Degenerating, in general, denotes the growing worſe, or loſing ſome valuable qualities whereof a thing was formerly poſſeſſed. Some naturaliſts have been of opinion, that things are capable of degenerating into quite a diſtinct ſpecies; but this is a mere chimera. All that happens in the degeneration of a plant, for inſtance, is the loſing its uſual beauty, colour, ſmell, &c. a misfortune entirely owing to its being planted in an improper ſoil, climate, &c.

DEGLUTITION, the action of ſwallowing. See Anatomy, n° 368.

A difficulty of ſwallowing may be cauſed, 1ſt, By ulcers of the œſophagus; in which caſe, there will be frequent vomiting of blood, and other kinds of matter. 2dly, A ſcirrhous bronchocele. 3dly, A thickening of the mucus in the œſophagus. 4thly, Indurations of the œſophagus. 5thly, A fungus in the œſophagus. 6thly, A ſacculus formed by ſome hard ſubſtance lodging a little time in the œſophagus, and weakening its coats. 7thly, By ſpaſms.

When any thing ſticks in its paſſage into the ſtomach, the beſt method is to relieve the patient with the greateſt ſpeed, by drawing it up, or puſhing it down into the ſtomach.

DEGRADATION, the act of depriving a perſon for ever of a dignity or degree of honour, and taking away the title, badge, and privileges of it.

Degradation, in painting, expreſſes the leſſening the appearance of diſtant objects in a landſkip, in the ſame manner as they would appear to an eye placed at that diſtance from them.

DEGREE, in geometry, a diviſion of a circle, including a three hundred and ſixtieth part of its circumference.

Degree *of Latitude*. See Latitude.

Degree *of Longitude*. See Longitude.

A degree of the meridian on the ſurface of the globe is variouſly determined by various obſervers. Mr Picart meaſured a degree in the latitude of 49° 21′, and found it equal to 57060 French toiſes. But the French mathematicians, who have lately examined Mr Picart's operations, aſſure us, that the degree in that latitude is 57183 toiſes. Our countryman, Mr Norwood, meaſured the diſtance between London and York, and found it 905751 Engliſh feet; and finding the difference of latitudes 2° 28′, determined the quantity of one degree to be 367196 Engliſh feet, or 69 Engliſh miles and 288 yards. Mr Maupertuis meaſured a degree in Lapland, in the latitude of 66° 20′, and found it 57438 toiſes. A degree was likewiſe meaſured at the equator by other French mathematicians, and found to contain 56767.8 toiſes. Whence it appears, that the earth is not a ſphere, but an oblate ſpheroid.

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* See *Beauty*.

Degree, in the civil and canon law, denotes an interval in kinſhip, by which proximity and remoteneſs of blood are computed. See Consanguinity, and Descent.

Degrees, in muſic, are the little intervals whereof the concords or harmonical intervals are compoſed.

Degree, in univerſities, denotes a quality conferred on the ſtudents or members thereof, as a teſtimony of their proficiency in the arts or ſciences, and intitling them to certain privileges.

DEJANIRA, in fabulous hiſtory, daughter of Oeneus king of Ætolia, and wife to Hercules. The centaur Neſſus endeavouring to raviſh her, was ſlain by Hercules with a poiſoned arrow. Neſſus, when dying, gave his bloody ſhirt to Dejanira; aſſuring her, that it was a ſovereign remedy to cure her huſband if ever he proved unfaithful. Some time after, Dejanira thinking ſhe had reaſon to ſuſpect his fidelity, ſent him the ſhirt; which he had no ſooner put on, than he was ſeized with the moſt excruciating torments; when being unable to ſupport his pains, he retired to mount Oeta, and erecting a pile of wood ſet fire to it, and threw himſelf into the flames; upon which Dejanira killed herſelf in deſpair.

DEJECTION, in medicine, the act of voiding the excrements by the anus.—When the fæces are accumulated in the inteſtinum rectum * in ſufficient quantity to become troubleſome either by their weight or acrimony, they excite a certain uneaſineſs, which produces an inclination to go to ſtool. The efforts for this purpoſe are begun by a conſiderable inſpiration, in conſequence of which the diaphragm is carried down towards the lower belly; the abdominal muſcles are at the ſame time contracted in obedience to the will; and the inteſtines being compreſſed on all ſides, the reſiſtance of the ſphincters is overcome, and the fæces paſs out at the anus; which is afterwards drawn up by its longitudinal fibres, which are called *levatores ani*, and then by means of its ſphincters is again contracted: but it ſometimes happens, as in dyſenteries, for inſtance, that the fæces are very thin, and have conſiderable acrimony; and then the irritation they occaſion is more frequent, ſo as to promote their diſcharge without any preſſure from the diaphragm or abdominal muſcles; and ſometimes involuntarily, as is the caſe when the ſphincters become paralytic.

* See *Anatomy*, n° 354.

DEIFICATION, in antiquity. See Apotheosis.

DEISM, the ſyſtem of religion acknowledged by the deiſts.

DEISTS, in the modern ſenſe of the word, are thoſe perſons in Chriſtian countries, who, acknowledging all the obligations and duties of natural religion, diſbelieve the Chriſtian ſcheme of revealed religion. They are ſo called from their belief in God alone, in oppoſition to Chriſtians. The learned Dr Clarke taking the denomination in the moſt extenſive ſignification, diſtinguiſhes deiſts into four ſorts. 1. Such as pretend to believe the exiſtence of an eternal, infinite, independent, intelligent Being; and who teach, that this ſupreme Being made the world, though they fancy he does not at all concern himſelf in the management of it. 2. Thoſe who believe not only the being, but alſo the providence, of God with reſpect to the natural world; but who, not allowing any difference between moral good and evil, deny that God takes any notice of the morally good or evil actions of men; theſe things depending, as they imagine, on the arbitrary conſtitutions of human laws. 3. Thoſe who having right apprehenſions concerning the natural attributes of God, and his all-governing providence, and ſome notion of his moral perfections alſo; yet, being prejudiced againſt the notion of the immortality of the human ſoul, believe that men periſh entirely at death, and that one generation ſhall perpetually ſucceed another, without any future reſtoration or renovation of things. 4. Such as believe the exiſtence of a ſupreme Being, together with his providence in the government of the world, as alſo the obligations of natural religion; but ſo far only as theſe things are diſcoverable by the light of nature alone, without believing any divine revelation. Theſe laſt are the only true deiſts; but as the principles of theſe men would naturally lead them to embrace the Chriſtian revelation, the learned author concludes there is now no conſiſtent ſcheme of deiſm in the world.

DEITY, a term frequently uſed in a ſynonymous ſenſe with God.

DELEGATE, in a general ſenſe, a deputy or commiſſioner.

Delegates, commiſſioners appointed by the king, under the great ſeal, to hear and determine appeals from the eccleſiaſtical court.

Court of **Delegates**, the great court of appeal in all eccleſiaſtical cauſes. Theſe delegates are appointed by the king's commiſſion under his great ſeal, and iſſuing out of chancery, to repreſent his royal perſon, and hear all appeals to him made by virtue of the ſtatute 25 Henry VIII. *c.* 19. This commiſſion is uſually filled with lords ſpiritual and temporal, judges of the courts at Weſtminſter, and doctors of the civil law. Appeals to Rome were always looked upon by the Engliſh nation, even in the times of Popery, with an evil eye, as being contrary to the liberty of the ſubject, the honour of the crown, and the independence of the whole realm; and were firſt introduced in very turbulent times, in the 16th year of king Stephen (A. D. 1151), at the ſame period (Sir Henry Spelman obſerves) that the civil and canon laws were firſt imported into England. But in a few years after, to obviate this growing practice, the conſtitutions made at Clarendon, 11 Hen. II. on account of the diſturbances raiſed by archbiſhop Becket and other zealots of the holy ſee, expreſsly declare, that appeals in cauſes eccleſiaſtical ought to lie from the archdeacon to the dioceſan; from the dioceſan to the archbiſhop of the province; and from the archbiſhop to the king; and are not to proceed any farther without ſpecial licenſe from the crown. But the unhappy advantage that was given in the reign of king John, and his ſon Hen. III. to the encroaching power of the Pope, who was ever vigilant to improve all opportunities of extending his juriſdiction to Britain, at length rivetted the cuſtom of appealing to Rome in cauſes eccleſiaſtical ſo ſtrongly, that it never could be thoroughly broken off, till the grand rupture happened in the reign of Hen. VIII. when all the juriſdiction uſurped by the Pope in matters eccleſiaſtical was reſtored to the crown, to which it originally belonged: ſo that the ſtatute 25 Hen. VIII. was but declaratory of the ancient law of the realm. But in caſe the king himſelf be party in any of theſe ſuits,

Blackſt. Comment.

ſuits, the appeal does not then lie to him in chancery, which would be abſurd; but, by the 24 Henry VIII. *c.* 12. to all the biſhops of the realm, aſſembled in the upper houſe of convocation.

DELEGATION, a commiſſion extraordinary given by a judge to take cogniſance of and determine ſome cauſe which ordinarily does not come before him.

Delegation, in Scots law. See Law, N° clxxvii. 8.

DELETERIOUS, an appellation given to things of a deſtructive or poiſonous nature. See Poison.

DELFT, a town of the united provinces, and capital of Delftland in Holland. It is a pretty large place, very clean and well built, with canals in the ſtreets, planted on each ſide with trees. The public buildings, eſpecially the town-houſe, are very magnificent. Here are two churches: in one is the tomb of the prince of Orange, who was aſſaſſinated; and in the other, that of admiral Tromp. It has a fine arſenal, well furniſhed; is about two miles in circumference, and is defended againſt inundations by three dams or dikes. Here is made a prodigious quantity of fine earthen ware called *delft-ware;* but the town has no other trade. It is pleaſantly ſituated among the meadows on the river Schie, in E. Long. 4. 13. N. Lat. 32. 6.

Delft-*Ware*, a kind of pottery of baked earth, covered with an enamel or white glazing, which gives it the appearance and neatneſs of porcelain.—Some kinds of this enamelled pottery differ much from others, either in their ſuſtaining ſudden heat without breaking, or in the beauty and regularity of their forms, of their enamel, and of the painting with which they are ornamented. In general, the fine and beautiful enamelled potteries, which approach the neareſt to porcelain in external appearance, are at the ſame time thoſe which leaſt reſiſt a briſk fire. Again, thoſe which ſuſtain a ſudden heat, are coarſe, and reſemble common pottery.

The baſis of this pottery is clay, which is to be mixed, when too fat, with ſuch a quantity of ſand, that the earth ſhall preſerve enough of its ductility to be worked, moulded, and turned eaſily; and yet that its fatneſs ſhall be ſufficiently taken from it, that it may not crack or ſhrink too much in drying or in baking. Veſſels formed of this earth muſt be dried very gently, to avoid cracking. They are then to be placed in a furnace to receive a ſlight baking, which is only meant to give them a certain conſiſtence or hardneſs. And, laſtly, they are to be covered with an enamel or glazing; which is done, by putting upon the veſſels thus prepared, the enamel, which has been ground very fine, and diluted with water.

As veſſels on which the enamel is applied are but ſlightly baked, they readily imbibe the water in which the enamel is ſuſpended, and a layer of this enamel adheres to their ſurface: theſe veſſels may then be painted with colours compoſed of metallic calces, mixed and ground with a fuſible glaſs. When they are become perfectly dry, they are to be placed in the furnace, included in caſes of baked earth called *ſeggars*, and expoſed to a heat capable of fuſing uniformly the enamel which covers them.—This heat given to fuſe the enamel being much ſtronger than that which was applied at firſt to give ſome conſiſtence to the ware, is alſo the heat neceſſary to complete the baking of it. The furnace and the colours uſed for painting this ware, are the ſame as thoſe employed for Porcelain. The glazing, which is nothing but white enamel, ought to be ſo opake as not to ſhew the ware under it. There are many receipts for making theſe enamels: but all of them are compoſed of ſand or flints, vitrifying ſalts, calx of lead, and calx of tin; and the ſand muſt be perfectly vitrified, ſo as to form a glaſs conſiderably fuſible. Somewhat leſs than an equal part of alkaline ſalt, or twice its weight of calx of lead, is requiſite to effect ſuch vitrifications of ſand. The calx of tin is not intended to be vitrified, but to give a white opake colour to the maſs; and one part of it is to be added to three or four parts of all the other ingredients taken together. From theſe general principles, various enamels may be made to ſuit the different kinds of earths. To make the enamel, lead and tin are calcined together with a ſtrong fire; and the ſand is alſo to be made into a fritt with the ſalts or aſhes. The whole is then to be well mixed and ground together. This matter is then to be placed under the furnace, where it is melted and vitrified during the baking of the ware. It is next to be ground in a mill, and applied as above directed.

Chem. Dict.

The preparation of the white enamel is a very eſſential article in making delft-ware, and one in which many artiſts fail. M. Boſc. d'Antic, in a Memoir concerning this kind of ware, publiſhed in the *Mem. des Scavans Etrang. tom.* 6. recommends the following proportions. An hundred pounds of calx of lead are to be mixed with about a ſeventh part of that quantity of calx of tin for common delft-ware, or a fourth part of calx of tin for the fineſt kind; an hundred, or an hundred and ten, pounds of fine ſand; and about 20 or 30 pounds of ſea-ſalt.—Concerning the earth of which the ware is made, he obſerves, that pure clay is not a proper material when uſed alone. Different kinds of earths mixed together are found to ſucceed better. Pieces of ware made of clay alone, are found to require too much time to dry; and they crack, and loſe their form, unleſs they are made exceedingly thick. An addition of marle diminiſhes the contraction of the clay; renders it leſs compact; and allows the water to eſcape, without altering the form of the ware in drying. It affords alſo a better ground for the enamel; which appears more gloſſy and white, than when laid on clay alone.—The kinds of clay which are chiefly uſed in the compoſition of delft-ware, are the blue and green. A mixture of blue clay and marle would not be ſufficiently ſolid, and would be apt to ſcale, unleſs it were expoſed to a fire more intenſe than what is commonly uſed for the burning of delft-ware. To give a greater ſolidity, ſome red clay is added; which, on account of its ferruginous matter, poſſeſſes the requiſite binding quality. The proportions of theſe ingredients vary in different works, according to the different qualities of the earths employed. Three parts of blue clay, two parts of red clay, and five parts of marle, form the compoſition uſed in ſeveral manufactories. M. d'Antic thinks, that the beſt delft-ware might be made of equal parts of pure clay and pure calcareous earth; but this compoſition would require that the fire ſhould be continued twice as long as it generally is.

DELIA, in antiquity, feaſts celebrated by the Athenians in honour of Apollo, ſurnamed *Delius.*

Delia was alſo a quinquennial feſtival in the iſland of Delos, inſtituted by Theſeus at his return from Crete, in honour of Venus, whoſe ſtatue, given him by Ariadne, he erected in that place, having by her aſſiſtance met with ſucceſs in his expedition.

DELIBAMENTA, in antiquity, a libation to the infernal gods, always offered by pouring downwards. See Libation.

JUS deliberandi. See Law, N° clxxx. 23.

DELIBERATIVE, an appellation given to a kind or branch of rhetoric, employed in proving a thing, or convincing an aſſembly thereof, in order to perſuade them to put it in execution.

To have a deliberative voice in the aſſembly, is when a perſon has a right to give his advice and his vote therein. In councils, the biſhops have *deliberative* voices; thoſe beneath them have only conſultative voices.

DELICT, in Scots law, ſignifies ſuch ſmall offences or breaches of the peace as are puniſhable only by fine or ſhort impriſonment.

DELINQUENT, a guilty perſon, or one who has committed ſome fault or offence for which he is puniſhable. See Britain, N° 97.

DELIQUESCENCE, in chemiſtry, ſignifies the property which certain bodies have of attracting moiſture from the air, and becoming liquid thereby. This property is never found but in ſaline ſubſtances, or matters containing them. It is cauſed by the great affinity which theſe ſubſtances have with water. The more ſimple they are, according to Mr Macquer, the more they incline to deliqueſcence. Hence, acids, and certain alkalies, which are the moſt ſimple, are alſo the moſt deliqueſcent ſalts. Mineral acids are ſo deliqueſcent, that they ſtrongly imbibe moiſture from the air, even though they are already mixed with a ſufficient quantity of water to be fluid. For this purpoſe, it is ſufficient that they be concentrated only to a certain degree.—Many neutral ſalts are deliqueſcent, chiefly thoſe whoſe baſes are not ſaline ſubſtances. Salts formed by the vitriolic acid, with fixed or volatile alkalies, earths, or moſt metallic ſubſtances, are not deliqueſcent; although this acid is the ſtrongeſt of all, and, when diſengaged, attracts the moiſture of the air moſt powerfully.

Though the immediate cauſe of deliqueſcence is the attraction of the moiſture of the air, as we have already obſerved; yet it remains to be ſhewn why ſome ſalts attract this moiſture powerfully, and others, though ſeemingly equally ſimple, do not attract it at all. The vegetable alkali, for inſtance, attracts moiſture powerfully; the mineral alkali, though to appearance equally ſimple, does not attract it at all. The acid of tartar by itſelf does not attract the moiſture of the air; but if mixed with borax, which has a little attraction for moiſture, the mixture is exceedingly deliqueſcent.—Some theories have been ſuggeſted, in order to account for theſe and other ſimilar facts; but we are as yet too little acquainted with the nature of the atmoſphere, and the relation its conſtituent parts have to thoſe of terreſtrial ſubſtances, to determine any thing with certainty on this head.

DELIQUIUM, a term frequently employed by chemiſts to characteriſe a body which is reſolved into a liquor by expoſure to the air. In this ſenſe they talk of the *deliquium* of a ſalt, as of ſalt of tartar for inſtance. This word is alſo frequently uſed inſtead of deliquescence.

DELIRIUM, from *deliro*, to rave or talk idly. When the ideas excited in the mind do not correſpond to the external objects, but are produced by the change induced on the common ſenſory, the patient is ſaid to be delirious. The Greeks call it *paraphreneſis*. In the Engliſh there is no word for it, except *light-headedneſs* be admitted.

The paraphreneſis, or delirium, differs from a madneſs, in not being perpetual, which happens in deliriums without a fever.—The proximate cauſe of a delirium is an affection of the brain; but the remote cauſes may be an irritation, ſometimes a very ſlight one, of any part of the nervous ſyſtem. See (the *Index* ſubjoined to) Medicine.

DELIVERY, or Child-birth. See Midwifery.

DELLY, or Delhi, a kingdom and city of the Mogul's empire, in Aſia. The city is one of the capitals of the empire. The road between it and *Agra* the other capital, is that famous alley or walk planted with trees by Jehan Ghir, and 150 leagues in length. Each half league is marked with a kind of turret; and at every ſtage there are little ſarays, or caravanſeras, for the benefit of travellers. The road, though pretty good, has many inconveniencies. It is not only frequented by wild beaſts, but by robbers. The latter are ſo dextrous at caſting a nooſe about a man's neck, that they never fail, if within reach, to ſeize and ſtrangle him. They gain their point likewiſe by means of handſome women; who, feigning great diſtreſs, and being taken up behind the unwary traveller, choak him with the ſame ſnare.—The capital conſiſts of three cities, built near one another. The firſt, now quite deſtroyed, is ſaid to have had 52 gates; and to have been the reſidence of king Porus, conquered by Alexander the Great. The ſecond, which is alſo in ruins, was demoliſhed by Shah Jehan, to build *Jehan-abad* with the materials. This makes the third city, and joins the ruins of the ſecond. This city ſtands in an open plain country, on the river *Jamna*, which riſes in this province. It is encompaſſed with walls, except towards the river. Theſe are of brick, flanked with round towers; but without a ditch, and terraced behind, four or five feet thick. The circumference of the walls may be about nine miles. The fortreſs, which is a mile and an half in circuit, has good walls and round towers, and ditches full of water, faced with ſtone. It is ſurrounded with fine gardens, and in it is the Mogul's palace. See Indostan. E. Long. 79. 25. N. Lat. 28. 20.

DELMENHORST, a ſtrong town of Germany, in the circle of Weſtphalia, and county of Oldenburgh, belonging to Denmark; ſeated on the river Delm near the Weſer. E. Long. 8. 37. N. Lat. 53. 10.

DELOS, an iſland of the Archipelago, very famous in ancient hiſtory. Originally it is ſaid to have been a floating iſland, but afterwards it became fixed and immoveable. It was held ſacred on account of its being the birth-place of Apollo and Diana.—Anciently this iſland was governed by its own kings. Virgil mentions one Anius reigning here in the time of the Trojan war. He was, according to that poet, both king and high-prieſt of Apollo, and entertained Æneas with great kindneſs. The Perſians allowed the Delians to enjoy their ancient liberties, after they had reduced the reſt of the Grecian iſlands. In after ages, the Athenians made themſelves maſters of it; and held it till they were driven out by Mithridates the Great, who plundered the rich temple of Apollo, and obliged the Delians to ſide with him. Mithridates was in his turn driven out by the Romans, who granted the inhabitants many privileges, and exempted them from all ſorts of taxes. At preſent it is quite abandoned; the lands being covered with ruins and rubbiſh, in ſuch a manner as to be quite incapable of cultivation. The inhabitants of Mycone hold it now, and pay but ten crowns land-tax to the Grand Signior for an iſland which was once one of the richeſt in the world.—Strabo and Callimachus tell us that the iſland of Delos was watered by the river Inapus: but Pliny calls it only a ſpring; and adds, that its waters ſwelled and abated at the ſame time with thoſe of the Nile. At preſent there is no river in the iſland, but one of the nobleſt ſprings in the world; being twelve paces in diameter, and incloſed partly by rocks, and partly by a wall. Mount Cynthus, whence Apollo had the ſurname of *Cynthius*, is by Strabo placed near the city, and ſaid to be ſo high, that the whole iſland was covered by its ſhadow; but our modern travellers ſpeak of it as an hill of a very moderate height. It is but one block of granate of the ordinary ſort, cut, on that ſide which faced the city, into regular ſteps, and incloſed on both ſides by a wall. On the top of the mountain are ſtill to be ſeen the remains of a ſtately building, with a moſaic pavement, many broken pillars, and other valuable monuments of antiquity. From an inſcription diſcovered there ſome time ago, and which mentions a vow made to Serapis, Iſis, and Anubis, ſome have conjectured, that on this hill ſtood a temple dedicated to theſe Egyptian deities, though no where mentioned in hiſtory.—The city of Delos, as is manifeſt from the magnificent ruins ſtill extant, took up that ſpacious plain reaching from one coaſt to the other. It was well peopled, and the richeſt city in the Archipelago, eſpecially after the deſtruction of Corinth; merchants flocking thither from all parts, both in regard of the immunity they enjoyed there, and of the convenient ſituation of the place between Europe and Aſia. Strabo calls it one of the moſt frequented empories in the world; and Pliny tells us, that all the commodities of Europe and Aſia were ſold, purchaſed, or exchanged there. It contained many noble and ſtately buildings; as, the temples of Apollo, Diana, and Latona; the porticoes of Philip of Macedon, and Dionyſius Eutyches; a gymnaſium; an oval baſon made at an immenſe expence, for the repreſentation of ſea-fights; and a moſt magnificent theatre. The temple of Apollo was, according to Plutarch, begun by *Eryſichton* the ſon of Cecrops; but afterwards enlarged and embelliſhed at the common charges of all the ſtates of Greece. Plutarch tells us, that it was one of the moſt ſtately buildings in the univerſe; and ſpeaks of an altar in it, which, in his opinion, deſerved a place among the wonders of the world. It was built with the horns of various animals, ſo artificially adapted to one another, that they hanged together without any cement. This altar is ſaid to have been a perfect cube; and the doubling it was a famous mathematical problem among the ancients. This went under the name of *Problema Deliacum*; and is ſaid to have been propoſed by the oracle, for the purpoſe of freeing the country from a plague. The diſtemper was to ceaſe when the problem was ſolved.—The trunk of the famous ſtatue of Apollo, mentioned by Strabo and Pliny, is ſtill an object of great admiration to travellers. It is without head, feet, arms, or legs; but from the parts that are yet remaining, it plainly appears, that the ancients did not exaggerate when they commended it as a wonder of art. It was of a gigantic ſize, though cut out of a ſingle block of marble; the ſhoulders being ſix feet broad, and the thighs nine feet round. At a ſmall diſtance from this ſtatue lies, amongſt confuſed heaps of broken columns, architraves, baſes, chapiters, &c. a ſquare piece of marble 15½ feet long, ten feet nine inches broad, and two feet three inches thick; which undoubtedly ſerved as a pedeſtal for this coloſſus. It bears, in very fair characters, this inſcription in Greek, "The Naxians to Apollo." Plutarch tells us, in the life of Nicias, that he cauſed to be ſet up, near the temple of Delos, an huge palm-tree of braſs, which he conſecrated to Apollo; and adds, that a violent ſtorm of wind threw down this tree on a coloſſian ſtatue raiſed by the inhabitants of Naxos. Round the temple were magnificent porticoes built at the charge of various princes, as appears from inſcriptions which are ſtill very plain. The names of Philip king of Macedon, Dionyſius Eutyches, Mithridates Euergetes, Mithridates Eupator, kings of Pontus, and Nicomedes king of Bithynia, are found on ſeveral pedeſtals.—To this temple the inhabitants of the neighbouring iſlands ſent yearly a company of virgins to celebrate, with dancing, the feſtival of Apollo and his ſiſter Diana, and to make offerings in the name of their reſpective cities.

So very ſacred was the iſland of Delos held by the ancients, that no hoſtilities were practiſed here, even by the nations that were at war with one another, when they happened to meet in this place. Of this, Livy gives an inſtance. He tells us, that ſome Roman deputies being obliged to put in at Delos, in their voyage to Syria and Egypt, found the galleys of Perſeus king of Macedon, and thoſe of Eumenes king of Pergamus, anchored in the ſame harbour, though theſe two princes were then making war upon one another.—Hence this iſland was a general aſylum, and the protection extended to all kinds of living creatures; for this reaſon it abounded with hares, no dogs being ſuffered to enter it. No dead body was ſuffered to be buried in it, nor was any woman ſuffered to lie-in there; all dying perſons, and women ready to be delivered, were carried over to the neighbouring iſland of Rhenæa.

DELPHINIUM, DOLPHIN-FLOWER, or LARKSPUR; a genus of the trigynia order, belonging to the polyandria claſs of plants. There are ſeven ſpecies; four are cultivated in gardens. Two of theſe are annual, and two perennial. They are herbaceous plants of upright growth, riſing from 18 inches to four feet in height, garniſhed with finely divided leaves, and terminated by long ſpikes of pentapetalous flowers of blue, red, white, or violet colours.—One ſpecies, the conſolida, is found wild in ſeveral parts of Britain, and grows in corn-fields. According to Mr Withering, the expreſſed juice of the petals, with a little alum, makes a good blue ink. The ſeeds are acrid and poi-

3 MA 53

Plate LXXXVII.

Fig. 2. **DAVIT.**

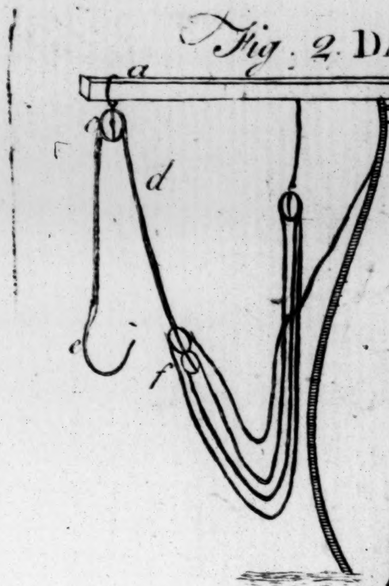


Fig. 1. **DASYPUS or ARMADILLO.**

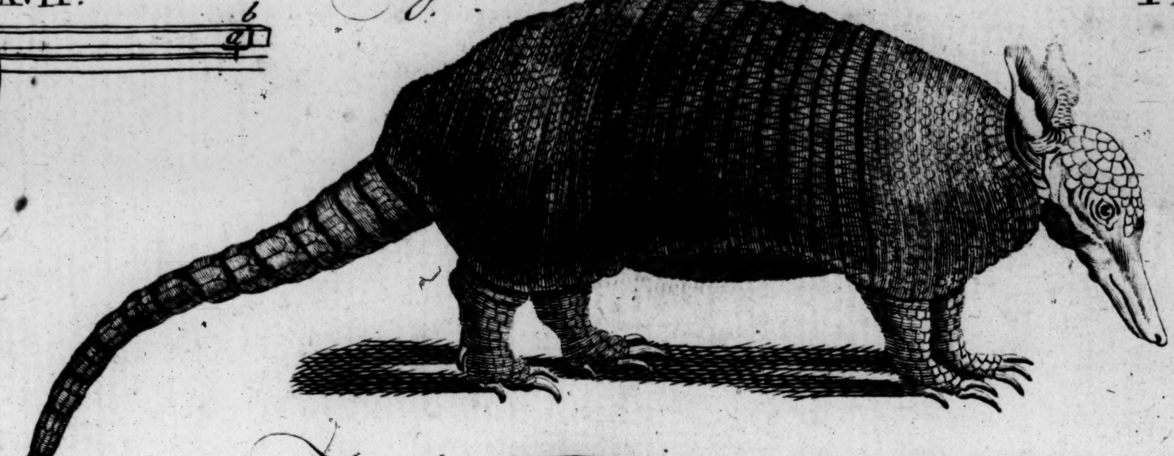


Fig. 3. **DEAD-EYES.**

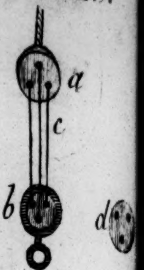


Fig. 4. **DELPHINUS or DOLPHIN.**

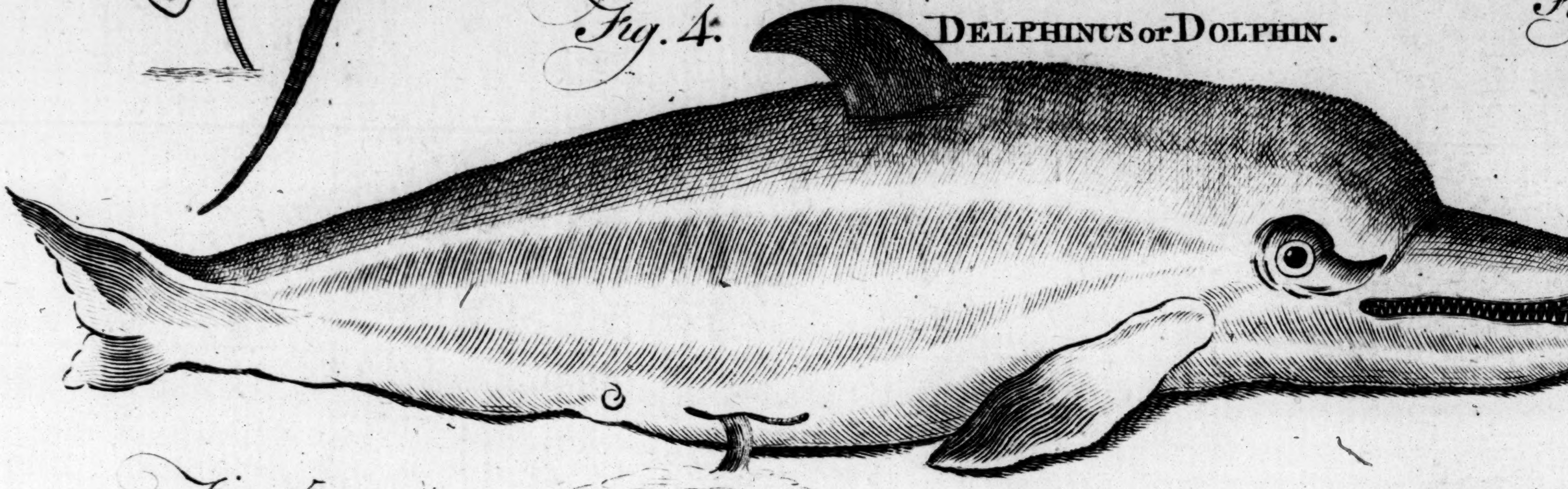


Fig. 9

Fig. 5. **DRACO or FLYING DRAGON.**

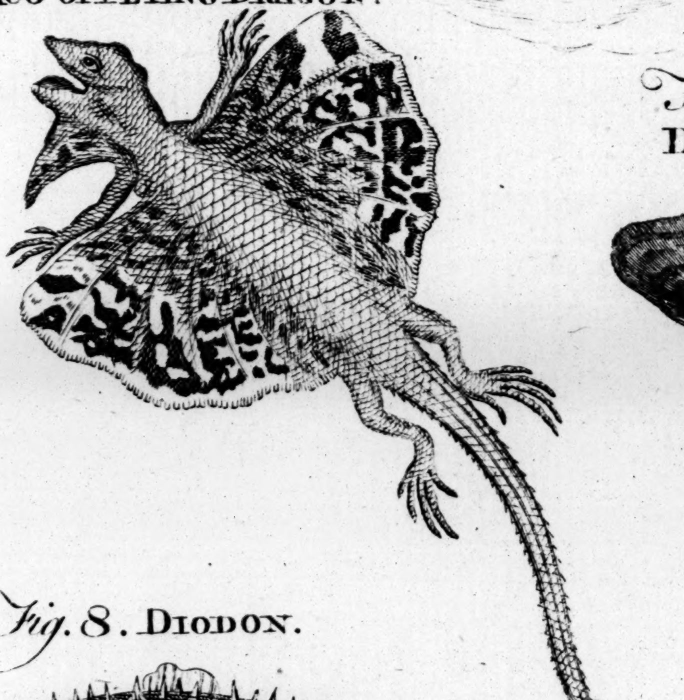


Fig. 6. **DONAX.**

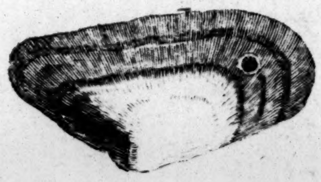


Fig. 7. **DIDELPHIS or OPOSSUM.**

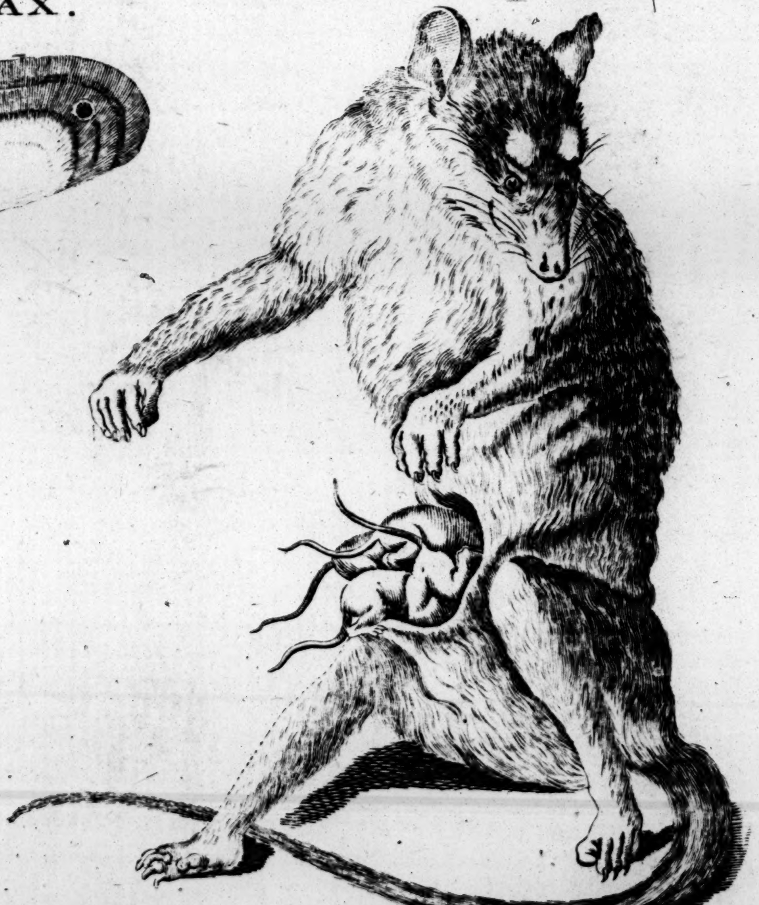
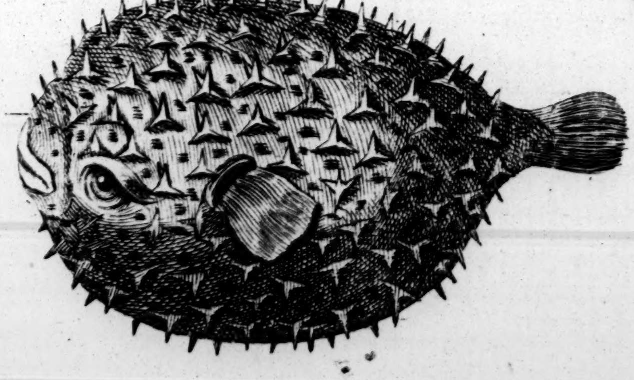


Fig. 8. **DIODON.**



A. Bell Sc.t

Delphinus, or dolphin.

ſonous. When cultivated, the bloſſoms often become double. Sheep and goats eat this plant; horſes are not fond of it; cows and ſwine refuſe it.—The firſt-mentioned ſpecies makes a very fine appearance in gardens, and is eaſily propagated by ſeeds; being ſo hardy, that it thrives in any ſoil or ſituation.

DELPHINUS, or DOLPHIN; a genus of fiſhes belonging to the order of Cete. There are three ſpecies.

1. The delphis, or dolphin. Hiſtorians and philoſophers ſeem to have contended who ſhould invent moſt fables concerning this fiſh. It was conſecrated to the gods, was celebrated in the earlieſt time for its fondeſs of the human race, was honoured with the title of the *ſacred fiſh*, and diſtinguiſhed by thoſe of *boy-loving* and *philanthropiſt.* It gave riſe to a long train of inventions, proofs of the credulity and ignorance of the times. Ariſtotle ſteers the cleareſt of all the ancients from theſe fables, and gives in general a faithful hiſtory of this animal; but the elder Pliny, Ælian, and others, ſeem to preſerve no bounds in their belief of the tales related of this fiſh's attachment to mankind. Scarce an accident could happen at ſea, but the dolphin offered himſelf to convey to ſhore the unfortunate. Arion the muſician, when flung into the ocean by the pirates, is received and ſaved by this benevolent fiſh.

Inde (fide majus) tergo Delphina recurvo,
Se memorant oneri ſuppoſuiſſe novo.
Ille ſedens citharamque tenens, pretiumque vehendi
Cantat, et æquoreas carmine mulcet aquas.
OVID. *Faſti*, lib. ii. 113.

But (paſt belief) a dolphin's arched back
Preſerved Arion from his deſtined wrack;
Secure he ſits, and with harmonious ſtrains
Requites his bearer for his friendly pains.

We are at a loſs to account for the origin of thoſe fables, ſince it does not appear that the dolphin ſhews a greater attachment to mankind, than the reſt of the cetaceous tribe. We know that at preſent the appearance of this fiſh, and the porpeſſe, are far from being eſteemed favourable omens by the ſeamen; for their boundings, ſprings, and frolics, in the water, are held to be ſure ſigns of an approaching gale.

It is from their leaps out of that element, that they aſſume a temporary form that is not natural to them; but which the old painters and ſculptors have almoſt always given them. A dolphin is ſcarce ever exhibited by the ancients in a ſtraight ſhape, but almoſt always incurvated: ſuch are thoſe on the coin of Alexander the Great, which is preſerved by Belon, as well as on ſeveral other pieces of antiquity. The poets deſcribe them much in the ſame manner, and it is not improbable but that the one had borrowed from the other:

Tumidumque pando tranſilit dorſo mare
Tyrrhenus omni piſcis exſultat freto,
Agitatque gyros. SENEC. Trag. Agam. 450.

Upon the ſwelling waves the dolphins ſhow
Their bending backs; then, ſwiftly darting, go,
And in a thouſand wreaths their bodies throw.

See Plate XXXVII. 4.

The natural ſhape of the dolphin * is almoſt ſtraight, the back being very ſlightly incurvated, and the body ſlender: the noſe is long, narrow, and pointed, not much unlike the beak of ſome birds, for which reaſon the French call it *l' oye de mer*. It has in all 40 teeth; 21 in the upper jaw, and 19 in the lower; a little above an inch long, conic at their upper end, ſharp-pointed, bending a little in. They are placed at ſmall diſtances from each other; ſo that when the mouth is ſhut, the teeth of both jaws lock into one another: the ſpout-hole is placed in the middle of the head; the tail is ſemilunar; the ſkin is ſmooth, the colour of the back and ſides duſky, the belly whitiſh: it ſwims with great ſwiftneſs; and its prey is fiſh. It was formerly reckoned a great delicacy: Dr Caius ſays, that one which was taken in his time, was thought a preſent worthy the duke of Norfolk, who diſtributed part of it among his friends. It was roaſted and dreſſed with porpeſſe ſauce, made of crumbs of fine wheat bread, mixed with vinegar and ſugar.

Delphinus, or dolphin.

This ſpecies of dolphin muſt not be confounded with that to which ſeamen give the name; the latter being quite another kind of fiſh, the *coryphæna hippuris* of Linnæus, and the *dorado* of the Portugueſe.

2. The phocæna, or porpeſſe. This ſpecies is found in vaſt multitudes in all parts of the Britiſh ſeas; but in greateſt numbers at the time when fiſh of paſſage appear, ſuch as mackerel, herrings, and ſalmon, which they purſue up the bays with the ſame eagerneſs as a dog does a hare. In ſome places they almoſt darken the ſea as they riſe above water to take breath: but porpeſſes not only ſeek for prey near the ſurface, but often deſcend to the bottom in ſearch of ſand-eels, and ſea-worms, which they root out of the ſand with their noſes in the ſame manner as hogs do in the fields for their food.

Their bodies are very thick towards the head, but grow ſlender towards the tail, forming the figure of a cone. The noſe projects a little, is much ſhorter than that of the dolphin, and is furniſhed with very ſtrong muſcles, which enables it the readier to turn up the ſand. In each jaw are 48 teeth, ſmall, ſharp-pointed, and a little moveable: like thoſe of the dolphin, they are ſo placed as that the teeth of one jaw locks into thoſe of the other when cloſed. The eyes are ſmall; the ſpout-hole is on the top of the head; the tail ſemilunar. The colour of the porpeſſe is generally black, and the belly whitiſh; but they ſometimes vary: in the river St Laurence there is a white kind; and Dr Borlaſe, in his voyage to the Scilly iſles, obſerved a ſmall ſpecies of cetaceous fiſh, which he calls *thornbacks*, from their broad and ſharp fin on the back; ſome of theſe were brown, ſome quite white, others ſpotted: but whether they were only a variety of this fiſh, or whether they were ſmall grampuſes, which are alſo ſpotted, we cannot determine.

Brit. Zool.

The porpeſſe is remarkable for the vaſt quantity of the fat or lard that ſurrounds the body, which yields a great quantity of excellent oil; from this lard, or from their rooting like ſwine, they are called in many places *ſea-hogs;* the Germans call them *meerſchwein;* the Swedes *marſuin;* and the Engliſh *porpeſſe*, from the Italian *porco peſce*.

It would be curious to trace the revolutions of faſhion in the article of eatables; what epicure firſt rejected the ſea-gull and heron, and what delicate ſtomach firſt nauſeated the greaſy fleſh of the porpeſſe. This latter was once a royal diſh, even ſo late as the reign of Henry VIII. and from its magnitude muſt have held a very reſpectable ſtation at the table; for in a houſehold book of that prince, extracts of which are publiſhed in the third volume of the Archæologia, it is ordered, that if a porpeſſe ſhould be too big for a horſe-load, allowance ſhould be made to the purveyor. This fiſh continued in vogue even in the reign of Elizabeth: for Doctor Caius, on mentioning a dolphin (that was taken at Shoreham, and brought to Thomas duke of Norfolk, who divided, and ſent it as a preſent to his friends) ſays, that it eat beſt with porpeſſe ſauce, which was made of vinegar, crums of fine bread, and ſugar.

3. The orca, or grampus, is found from the length of 15 feet to that of 25. It is remarkably thick in proportion to its length, one of 18 feet being in the thickeſt place 10 feet diameter. With reaſon then did Pliny call this "an immenſe heap of fleſh armed with dreadful teeth." It is extremely voracious; and will not even ſpare the porpeſſe, a congenerous fiſh. It is ſaid to be a great enemy to the whale, and that it will faſten on it like a dog on a bull, till the animal roars with pain. The noſe is flat, and turns up at the end. There are 30 teeth in each jaw: thoſe before are blunt, round, and ſlender; the fartheſt ſharp and thick: between each is a ſpace adapted to receive the teeth of the oppoſite jaw when the mouth is cloſed. The ſpout-hole is in the top of the neck. The colour of the back is black, but on each ſhoulder is a large white ſpot; the ſides marbled with black and white; the belly of a ſnowy whiteneſs.

Theſe fiſhes ſometimes appear on our coaſts; but are found in much greater numbers off the North Cape in Norway, whence they are called the *North-Capers*. Theſe and all other whales are obſerved to ſwim againſt the wind; and to be much diſturbed, and tumble about with unuſual violence, at the approach of a ſtorm.

Delphinus, in aſtronomy, a conſtellation of the northern hemiſphere. See Astronomy, n° 206.

DELPHOS, a town of Turky in Aſia, in the province of Libadia, anciently Phocis. In former times it was famous for an oracle of Apollo. See Oracle.

DELTA, is a part of Lower Egypt, which takes up a conſiderable ſpace of ground between the branches of the Nile and the Mediterranean Sea: the ancients called it the *Iſle of Delta*, becauſe it is in the ſhape of a triangle, like the Greek letter of that name. It is about 130 miles along the coaſt from Damietta to Alexandria, and 70 on the ſides from the place where the Nile begins to divide itſelf. It is the moſt plentiful country of all Egypt, and it rains more there than in other parts, but the fertility is chiefly owing to the inundation of the river Nile. The principal towns on the coaſt are, Damietta, Roſetta, and Alexandria; but, within land, Menouſia and Maala, or Elmala.

DELTOIDES, in anatomy. See Anatomy, *Table of the Muſcles*.

DELUGE, an inundation or overflowing of the earth, either wholly or in part, by water.

We have ſeveral deluges recorded in hiſtory; as that of Ogyges, which overflowed almoſt all Attica; and that of Deucalion, which drowned all Theſſaly in Greece: but the moſt memorable was that called the *Univerſal Deluge*, or *Noah's Flood*, which overflowed and deſtroyed the whole earth; and from which only Noah, and thoſe with him in the ark, eſcaped.

The deſtruction of the whole earth by water, and its formation anew in the way we ſee it, is an event ſo exceedingly remarkable, and ſo much out of the ordinary courſe of nature, that it is no wonder to find the reality of the fact called in queſtion by many. As the giving up this point, however, would utterly deſtroy the authenticity of the ſacred writings, thoſe who have undertaken the defence of revelation, have conſequently laboured to bring ſome poſitive evidence of the fact, diſtinct from that of Moſes; and not only to ſhew how by natural means ſuch an event might have happened, but likewiſe to bring proofs that it actually did happen. There are two principal arguments againſt the exiſtence of a univerſal deluge: 1. The want of a ſufficient quantity of water to cover the whole earth to the height mentioned by Moſes. Or, 2. Suppoſing this to be obviated, the immutability of the laws of nature are urged; as it is thought, that, during the time of the flood, the great law of gravitation muſt have been ſuſpended, or rather reverſed, and the fluid water have had no tendency to return to the loweſt parts of the earth as we ſee it hath at preſent.—On the other hand, moſt of thoſe who maintain the reality of the univerſal deluge, have had recourſe to the waters of the ocean as ſufficient in quantity; and to the omnipotence of God, exerted either immediately, or by the mediation of ſome of the great natural agents, for raiſing them to the height to which they are ſaid to have riſen.

The finding a quantity of water ſufficient for an univerſal deluge, hath however been looked on as a matter of great difficulty, and various hypotheſes have been invented to ſolve it.

1. It hath been aſſerted, that a quantity of water was created on purpoſe, and at a proper time annihilated by divine power. This, however, beſides its being abſolutely without evidence, is directly contrary to the words of the ſacred writer whom the aſſerters of this hypotheſis mean to defend. He expreſsly derives the waters of the flood from two ſources; firſt, the *fountains of the great deep*, which he tells us were *all* broken up; and ſecondly, the *windows of heaven*, which he ſays were opened: and ſpeaking of the decreaſe of the waters, he ſays, the fountains of the deep and the windows of heaven were *ſtopped*, and the waters *returned* continually from off the earth. Here it is obvious, that Moſes was ſo far from having any difficulty about the quantity of water, that he thought the ſources from whence it came were not exhauſted; ſince both of them required to be *ſtopped* by the ſame Almighty hand who opened them, leſt the flood ſhould increaſe more than it actually did.

2. Dr Burnet, in his *Telluris Theoria Sacra*, endeavours to ſhew, that all the waters in the ocean are not ſufficient to cover the earth to the depth aſſigned by Moſes. Suppoſing the ſea drained quite dry, and all the clouds of the atmoſphere diſſolved into rain, we ſhould ſtill, according to him, want much the greateſt part of the water of a deluge. To get clear of this difficulty, Dr Burnet and others have adopted Deſcartes's theory. That philoſopher will have the antediluvian world to have been perfectly round and equal, without mountains or valleys. He accounts for its formation on mechanical principles, by ſuppoſing it at firſt in the condition of a thick turbid fluid replete with divers heterogeneous matters; which, ſubſiding by ſlow degrees, formed themſelves into different concentric ſtrata, or beds; by the laws of gravity. Dr Burnet improves on this theory, by ſuppoſing

the primitive earth to have been no more than a ſhell or cruſt inveſting the ſurface of the water contained in the ocean, and in the central abyſs which he and others ſuppoſe to exiſt in the bowels of the earth *. At the time of the flood, this outward cruſt, according to him, broke in a thouſand places; and conſequently ſunk down among the water, which thus ſpouted up in vaſt cataracts, and overflowed the whole ſurface. He ſuppoſes alſo, that before the flood there was a perfect coincidence of the equator with the ecliptic, and conſequently that the antediluvian world enjoyed a perpetual ſpring; but that the violence of the ſhock by which the outer cruſt was broken, ſhifted alſo the poſition of the earth, and produced the preſent obliquity of the ecliptic. This theory, it will be obſerved, is equally arbitrary with the former. But it is, beſides, directly contrary to the words of Moſes, who aſſures us, that all the *high hills* were covered; while Dr Burnet affirms that there were then no hills in being.

3. Other authors, ſuppoſing a ſufficient fund of water in the abyſs, or ſea, are only concerned for an expedient to bring it forth: accordingly, ſome have recourſe to a ſhifting of the earth's centre of gravity, which, drawing after it the water out of its channel, overwhelmed the ſeveral parts of the earth ſucceſſively.

4. The inquiſitive Mr Whiſton, in his *New Theory of the Earth*, ſhews, from ſeveral remarkable co-incidences, that a comet deſcending in the plane of the ecliptic, towards its perihelion, paſſed juſt before the earth on the firſt day of the deluge; the conſequences whereof would be, firſt, that this comet, when it came below the moon, would raiſe a vaſt and ſtrong tide, both in the ſmall ſeas which according to his hypotheſis were in the antediluvian earth, (for he allows no great ocean there, as in ours), and alſo in the abyſs which was under the upper cruſt of the earth. And this tide would riſe, and increaſe all the time of the approach of the comet towards the earth; and would be at its greateſt height when the comet was at its leaſt diſtance from it. By the force of which tide, as alſo by the attraction of the comet, he judges, that the abyſs muſt put on an elliptical figure, whoſe ſurface being conſiderably larger than the former ſpherical one, the outward cruſt of the earth, incumbent on the abyſs, muſt accommodate itſelf to that figure, which it could not do while it held ſolid, and conjoined together. He concludes, therefore, that it muſt of neceſſity be extended, and at laſt broke by the violence of the ſaid tides, and attraction; out of which the included water iſſuing, was a great means of the deluge: this anſwering to what Moſes ſpeaks of the "fountains of the great deep being broke open."—Again, the ſame comet, he ſhews, in its deſcent towards the ſun, paſſed ſo cloſe by the body of the earth, as to involve it in its atmoſphere, and tail, for a conſiderable time; and of conſequence, left a vaſt quantity of its vapours, both expanded and condenſed, on its ſurface; a great part of which being afterwards rarefied by the ſolar heat would be drawn up into the atmoſphere, and afterwards return in violent rains: and this he takes to be what Moſes intimates by "the windows of heaven being opened," and particularly by the "forty days rain." For as the following rain, which with this made the whole time of raining 150 days, Mr Whiſton attributes it to the earth coming a ſecond time within the atmoſphere of the comet, as the comet was on its return from the ſun. Laſtly, to remove this vaſt orb of waters again, he ſuppoſes a mighty wind to have ariſen, which dried up ſome, and forced the reſt into the abyſs again through the clefts by which it came up: only a good quantity remained in the alveus of the great ocean, now firſt made, and in leſſer ſeas, lakes, &c.—This theory was at firſt only propoſed as an hypotheſis; but, on further conſideration, Mr Whiſton thought he could actually prove that a comet did at that time paſs very near the earth, and that it was the ſame which afterwards appeared in 1680. After this, he looked upon his theory no longer as an hypotheſis, but publiſhed it in a particular tract entitled *The cauſe of the deluge demonſtrated*.—But the uncertainty of the comet's return in 1758, when ſuppoſed to be abſent only 75 or 76 years *, muſt certainly render Mr Whiſton's calculations for ſuch a length of time extremely dubious; and, the great ſimilarity between the tails of comets and ſtreams of electric matter renders his ſuppoſition of their being aqueous vapours exceedingly improbable.

5. According to Mr de la Pryme, the antediluvian world had an external ſea, as well as land, with mountains, rivers, &c. and the deluge was effected by breaking the ſubterraneous caverns, and pillars thereof, with dreadful earthquakes, and cauſing the ſame to be for the moſt part, if not wholly, abſorbed and ſwallowed up, and covered by the ſeas that we now have. Laſtly, this earth of ours aroſe out of the bottom of the antediluvian ſea; and in its room, juſt as many iſlands are ſwallowed down, and others thruſt up in their ſtead.—On this, as on all the other hypotheſes, it may be remarked, that it is quite arbitrary, and without the leaſt foundation from the words of Moſes. The ſacred hiſtorian ſpeaks not one word of earthquakes; nay, from the nature of the thing, we know it is impoſſible that the flood could have been occaſioned by an earthquake, and the ark preſerved, without a miracle. It is certain, that, if a ſhip ſinks at ſea, the commotion excited in the water by the deſcent of ſuch a large body, will ſwallow up a ſmall boat that happens to come too near. If the pillars of the earth itſelf then were broken, what muſt the commotion have been, when the continents of Europe, Aſia, and Africa, deſcended into the abyſs at once? not to mention America, which lying at ſo great a diſtance from Noah, he might be ſuppoſed out of danger from that quarter. By what miracle was the little ark preſerved amidſt the tumult of thoſe impetuous waves which muſt have ruſhed in from all quarters? Beſides, as the ark was built not at ſea, but on dry ground; when the earth on which it reſted ſunk down, the ark muſt have ſunk along with it; and the waters falling in as it were over-head, muſt have daſhed in pieces the ſtrongeſt veſſel that can be imagined. Earthquakes, alſo, operate ſuddenly and violently; whereas, according to the Moſaic account, the flood came on gradually, and did not arrive at its height till ſix weeks, or perhaps five months, after it began.

6. Mr Hutchinſon and his followers preſent us with a theory of the deluge, which they pretend to derive from the word of God itſelf. This theory hath been particularly enlarged upon and illuſtrated by Mr Catcot, who in 1768 publiſhed a volume on the ſubject.

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* See *Abyſs*.

* See *Aſtronomy*, n° 50,—55.

This gentleman aſſerts, that when the world was firſt created, at the time when it is ſaid to have been "without form and void," the terreſtrial matter was then entirely diſſolved in the aqueous; ſo that the whole formed, as it were, a thick muddy water. The figure of the whole was ſpherical; and on the outſide of this ſphere, lay the groſs dark air. Within the ſphere of earth and water, was an immenſe cavity, called by Moſes the *deep;* and this internal cavity was filled with air of a kind ſimilar to that on the outſide. On the creation of light, the internal air received elaſticity ſufficient to burſt out through the external covering of earth and water. Upon this the water deſcended, filled up the void, and left the earth in a form ſimilar to what it hath at preſent.—Thus, according to him, the antediluvian world, as well as the preſent, conſiſted of a vaſt collection or nucleus of water, called the *great deep*, or the *abyſs;* and over this the ſhell of earth, perforated in many places; by which means the waters of the ocean communicated with the abyſs. The breaking up of theſe fountains was occaſioned by a miraculous preſſure of the atmoſphere, from the immediate action of the Deity himſelf. So violent was this preſſure, that the air deſcended to where it had been originally; occupied the ſpace of the abyſs; and drove out the waters over the whole face of the dry land.—But this account, ſo far from being infallibly certain, ſeems inconſiſtent with the moſt common obſervations. No preſſure, however violent, will cauſe water riſe above its level, unleſs that preſſure is unequal. If, therefore, the atmoſphere entered into the ſuppoſed abyſs, by a vehement preſſure on the ſurface of the ocean, that preſſure muſt only have been on one place, or on a few places: and even though we ſuppoſe the atmoſphere to have been the agent made uſe of, it is impoſſible, that it could have remained for any time in the abyſs, without a continued miracle; as the preſſure of the water would immediately have forced it up again, through thoſe holes which had afforded it a paſſage downwards.

The explication given from Hutchinſon by Mr Catcot, of the "windows of heaven," is ſome what extraordinary. According to him, theſe windows are not in heaven, but in the bowels of the earth; and mean no more than the cracks and fiſſures by which the *airs*, as he calls them, found a paſſage through the ſhell or covering of earth, which they utterly diſſolved, and reduced to its original ſtate of fluidity. It is, however, difficult to conceive how the opening of ſuch windows as theſe could cauſe a violent rain for 40 days and nights.

It is not to be ſuppoſed, that we can pretend to aſcertain any thing on the ſubject more than others have done. The following conjectures, however, may be offered on the manner in which the deluge might have happened without any violence to the eſtabliſhed laws of nature.

1. If we conſider the quantity of water requiſite for the purpoſe of the deluge, it will not appear ſo very extraordinary as has been commonly repreſented. The height of the higheſt hills is not thought to exceed three miles. It will therefore be deemed a ſufficient allowance, when we ſuppoſe the waters of the deluge to have been four miles deep on the ſurface of the ground. Now, it is certain, that water, or any other matter, when ſpread out at large upon the ground, ſeems to occupy an immenſe ſpace in compariſon of what it does when contained in a cubical veſſel, or when packed together in a cubical form. Suppoſe we wanted to overflow a room 16 feet every way, or containing 256 ſquare feet, with water, to the height of one foot, it may be nearly done by a cubical veſſel of ſix feet, filled with water. A cube of eight feet will cover it two feet deep, and a cube of ten feet will very nearly cover it four feet deep. It makes not the leaſt difference, whether we ſuppoſe feet or miles, to be covered. A cube of ten miles of water, would very nearly overflow 256 ſquare miles of plain ground, to the height of four miles. But if we take into our account the vaſt number of eminences with which the ſurface of the earth abounds, the abovementioned quantity of water would do a great deal more. If, therefore, we attempt to calculate the quantity of water ſufficient to deluge the earth, we muſt make a very conſiderable allowance for the bulk of all the hills on its ſurface. To conſider this matter, however, in its utmoſt latitude. The ſurface of the earth is ſuppoſed, by the lateſt computations, to contain 199,512,595 ſquare miles. To overflow this ſurface to the height of four miles, is required a parallelopiped of water 16 miles deep, and containing 49,878,148 ſquare miles of ſurface. Now, conſidering the immenſe thickneſs of the globe of the earth, it can by no means be improbable, that this whole quantity of water may be contained in its bowels; without the neceſſity of any remarkable abyſs, or huge collection of water, ſuch as moſt of our theoriſts ſuppoſe to exiſt in the centre. It is certain, that as far as the earth has been dug, it hath been found not dry, but moiſt; nor have we the leaſt reaſon to imagine, that it is not at leaſt equally moiſt all the way down to the centre. How moiſt it really is, cannot be known, nor the quantity of water requiſite to impart to it the degree of moiſture it has; but we are ſure it muſt be immenſe. The earth is computed to be near 8000 miles in diameter. The ocean is of an unfathomable depth; but there is no reaſon for ſuppoſing it more than a few miles. To make all reaſonable allowances, however, we ſhall ſuppoſe the whole ſolid matter in the globe to be only equal to a cube of 5000 miles; and even on this ſuppoſition we ſhall find, that all the waters of the deluge would not be half ſufficient to moiſten it. The above mentioned parallelopiped of water would indeed contain 798,050,368 cubic miles of that fluid; but the cube of earth containing no leſs than an hundred and twenty-five thouſand millions of cubic miles, it is evident, that the quantity aſſigned for the deluge would ſcarce be known to moiſten it. It could have indeed no more effect this way, than a ſingle pound of water could have upon 150 times its bulk of dry earth. We are perſuaded therefore, that any perſon who will try by experiment how much water a given quantity of earth contains, and from that experiment will make calculations with regard to the whole quantity of water contained in the bowels of the earth, muſt be abundantly ſatisfied, that though *all* the water of the deluge had been thence derived, the diminution of the generalſtore would, comparatively ſpeaking, have been next to nothing.

2. It was not from the bowels of the earth only that the waters were diſcharged, but alſo from the air; for we are aſſured by Moſes, that it rained 40 days

and 40 nights. This ſource of the diluvian waters hath been conſidered as of ſmall conſequence by almoſt every one who hath treated on the ſubject. The general opinion concerning this matter we ſhall tranſcribe from the Univerſal Hiſtory, Vol. I. where it is very fully expreſſed. "According to the obſervations made of the quantity of water that falls in rain, the rains could not afford one ocean, nor half an ocean, and would be a very inconſiderable part of what was neceſſary for a deluge. If it rained 40 days and 40 nights throughout the whole earth at once, it might be ſufficient to lay all the lower grounds under water, but it would ſignify very little as to the overflowing of the mountains; ſo that it has been ſaid, that if the deluge had been made by rains only, there would have needed not 40 days, but 40 years to have brought it to paſs. And if we ſuppoſe the whole atmoſphere condenſed into water, it would not all have been ſufficient for this effect; for it is certain that it could not have riſen above 32 foot, the height to which water can be raiſed by the preſſure of the atmoſphere: for the weight of the whole air, when condenſed into water, can be no more than equal to its weight in its natural ſtate, and muſt become no leſs than 800 times denſer; for that is the difference between the weight of the heavieſt air, and that of water."

On this ſubject we muſt obſerve, that there is a very general miſtake with regard to the air, ſimilar to the afore-mentioned one regarding the earth. Becauſe the earth below our feet appears to our ſenſes firm and compact, therefore the vaſt quantity of water, contained even in the moſt ſolid parts of it, and which will readily appear on proper experiment, is overlooked, and treated as a non-entity. In like manner, becauſe the air does not always deluge with exceſſive rains, it is alſo imagined that it contains but very little water. Becauſe the preſſure of the air is able to raiſe only 32 feet of water on the ſurface of the earth, it is therefore ſuppoſed we may know to what depth the atmoſphere could deluge the earth if it was to let fall the *whole* water contained in it. But daily obſervations ſhew, that the preſſure of the atmoſphere hath not the leaſt connection with the quantity of water it contains. Nay, if there is any connection, the air ſeems to be lighteſt when it contains moſt water. In the courſe of a long ſummer's drought, for inſtance, the mercury in the barometer will ſtand at 30 inches, or little more. If it does ſo at the beginning of the drought, it ought to aſcend continually during the time the dry weather continues; becauſe the air is all the while abſorbing water in great quantity from the ſurface of the earth and ſea. This, however, is known to be contrary to fact. At ſuch times the mercury does not aſcend, but remains ſtationary; and what is ſtill more extraordinary, when the drought is about to have an end, the air, while it yet contains the whole quantity of water it abſorbed, and hath not diſcharged one ſingle drop, becomes ſuddenly lighter, and the mercury will perhaps ſink an inch before any rain falls. The moſt ſurpriſing phenomenon, however, is yet to come. After the atmoſphere has been diſcharging for a number of days ſucceſſively a quantity of matter 800 times heavier than itſelf, inſtead of being *lightened* by the diſcharge, it becomes *heavier*, nay *ſpecifically* heavier, than it was before. It is alſo certain, that very dry air, provided it is not at the ſame time very hot, is always heavieſt; and the drieſt air which we are acquainted with, namely Dr Prieſtley's *dephlogiſticated* air, is conſiderably heavier than the air we commonly breathe. For theſe reaſons we think the quantity of water contained in the whole atmoſphere ought to be conſidered as *indefinite*, eſpecially as we know that by whatever agent it is ſuſpended, that agent muſt counteract the force of gravity, otherwiſe the water would immediately deſcend; and while the force of gravity in any ſubſtance is counteracted, that ſubſtance cannot appear to us to gravitate at all.

3. The above conſiderations render it *probable* at leaſt, that there is in nature a quantity of water ſufficient to deluge the world, provided it was applied to the purpoſe. We muſt next conſider whether there is any natural agent powerful enough to effectuate this purpoſe. We ſhall take the phraſes uſed by Moſes in their moſt obvious ſenſe. The breaking up of the fountains of the deep we may reaſonably ſuppoſe to have been the opening of all the paſſages whether ſmall or great, thro' which the ſubterraneous waters poſſibly could diſcharge themſelves on the ſurface of the earth. The opening of the windows of heaven we may alſo ſuppoſe to be the pouring out the water, contained in the atmoſphere, thro' thoſe inviſible paſſages by which it enters in ſuch a manner as totally to elude every one of our ſenſes, as when water is abſorbed by the air in evaporation. As both theſe are ſaid to have been opened at the ſame time, it ſeems from thence probable, that one natural agent was employed to do both. Now it is certain, that the induſtry of modern inquirers hath diſcovered an agent unknown to the former ages, and whoſe influence is ſo great, that with regard to this world it may be ſaid to have a kind of *omnipotence*. The agent we mean is electricity. It is certain, that, by means of it, immenſe quantities of water can be raiſed to a great height in the air. This is proved by the phenomena of water-ſpouts. Mr Forſter relates, that he happened to ſee one break very near him, and obſerved a flaſh of lightning proceed from it at the moment of its breaking. The concluſion from this is obvious. When the electric matter was diſcharged from the water, it could no longer be ſupported by the atmoſphere, but immediately fell down. Though water-ſpouts do not appear in this country, yet every one muſt have made an obſervation ſomewhat ſimilar to Mr Forſter's. In a violent ſtorm of thunder and rain, after every flaſh of lightning, or diſcharge of electricity from the clouds, the rain pours down with increaſed violence; thus ſhewing, that the cloud, having parted with ſo much of its electricity, cannot longer be ſupported in the form of vapour, but muſt deſcend in rain. It is not indeed yet diſcovered that electricity is the cauſe of the ſuſpenſion of water in the atmoſphere; but it is certain that evaporation is promoted by electrifying the fluid to be evaporated *. It may therefore be admitted as a *poſſibility*, that the electric fluid contained in the air is the agent by which it is enabled to ſuſpend the water which riſes in vapour. If therefore the air is deprived of the due proportion of this fluid, it is evident that rain muſt fall in prodigious quantities.

Again, we are aſſured, from the moſt undeniable obſervations, that electricity is able to ſwell up water on the ſurface of the earth. This we can make it do even in our trifling experiments ; and much more muſt the whole force of the fluid be ſuppoſed capable of doing it, if applied to the waters of the ocean, or any others. The agitation of the ſea in earthquakes is a ſufficient proof of this [‡]. It is certain, that at theſe times there is a diſcharge of a vaſt quantity of electric matter from the earth into the air ; and as ſoon as this happens, all becomes quiet on the ſurface of the earth.

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* See *Electricity*, and *Evaporation*.

From a multitude of obſervations, it alſo appears, that there is, at all times, a paſſage of electric matter from the atmoſphere into the earth, and *vice verſa* from the earth into the atmoſphere. There is therefore no abſurdity in ſuppoſing the Deity to have influenced the action of the natural powers in ſuch a manner that for 40 days and nights the electric matter contained in the atmoſphere ſhould deſcend into the bowels of the earth ;—if indeed there is occaſion for ſuppoſing any ſuch immediate influence at all, ſince it is not impoſſible that there might have been, from ſome natural cauſe, a deſcent of this matter from the atmoſphere for that time. But by whatever cauſe the deſcent was occaſioned, the conſequence would be, the *breaking up of the fountains of the deep*, and the *opening the windows of heaven*. The water contained in the atmoſphere being left without ſupport, would deſcend in impetuous rains ; while the waters of the ocean, thoſe from which fountains originate, and thoſe contained in the ſolid earth itſelf, would riſe from the very centre, and meet the waters which deſcended from above. Thus the breaking up of the fountains of the deep, and the opening the windows of heaven, would accompany each other, as Moſes tells us they actually did ; for, according to him, both happened on the ſame day.

In this manner the flood would come on quietly and gradually, without that violence to the globe which Burnet, Whiſton, and other theoriſts, are obliged to ſuppoſe. The abatement of the waters would enſue on the aſcent of the electric fluid to where it was before. The atmoſphere would then abſorb the water as formerly ; that which had aſcended through the earth would again ſubſide ; and thus every thing would return to its priſtine ſtate.

Thus, we think, the Moſaic account of the deluge may reaſonably enough be received as a *poſſibility*, even by the moſt rigid inquirers : it remains now to take notice of thoſe proofs which have been brought for it as a *matter of fact*. Theſe may be reduced to two : 1. The general conſent of all nations ; and, 2. The exiſtence of vaſt quantities of marine productions on the tops of mountains, and under the ſurface of the ground, at great diſtances from the ſea.—The latter of theſe hath been moſt inſiſted on, and till lately was generally reckoned deciſive. The obſervations, however, of the lateſt philoſophers, on volcanoes, have furniſhed an evaſion of this argument. Sir William Hamilton firſt ſhewed, that volcanoes are capable of forming mountains of very conſiderable ſize ; that the fire of them lies very deep, and often below the water of the ocean itſelf. Hence, it is eaſy to ſee, how marine ſubſtances may be found at all depths on theſe volcanic mountains, and yet afford no proof of a deluge. Others have improved on this, and ſeem inclined to ſuppoſe that *all* the mountains, nay, *all* the habitable parts of the globe, were originally thrown up by volcanic exploſions from the bottom of the ocean. But for a particular conſideration of theſe matters, ſee the articles EARTH, MOUNTAIN, and VOLCANO.

DEMADES, a famous Athenian, who, from being a mariner, became a great orator, and appeaſed Philip by his eloquence, after the famous victory over the Athenians at Cheronea, in the 338th year B. C.

DEMAIN, or DEMESNE, in its common acceptation, is uſed for the lands round a manor-houſe, occupied by the lord.

DEMAIN, or *Demeſne*, in law, is commonly underſtood to be the lord's chief manor-place, with the lands thereto belonging, which he and his anceſtors have, time out of mind, kept in their own manual occupation.

DEMAND, in its popular ſenſe, denotes a calling for or requiring one's due.

DEMAND, in law, has a more ſpecial ſignification, as contradiſtinguiſhed from *plaint :* for all civil actions are purſued either by demands or plaints ; according to which the purſuer is called either *demandant* or *plaintiff :* viz. in real actions, *demandant ;* and in perſonal actions, *plaintiff*. See PLAINTIFF.

Where the party purſuing is called *demandant*, the party purſued is called *tenant ;* and where *plaintiff*, *defendant*. See DEFENDANT.

There are two kinds of demands : the one in *deed*, *de facto*, as in every precipe : the other in *law*, *de jure ;* ſuch is entry in land, diſtreſs for rent, &c.

DEMEMBRE, in heraldry, is ſaid of diſmembered animals, or thoſe with their limbs cut off.

DEMEMBRATION, in Scots law. See LAW, N° clxxxvi. 17.

DEMESNE. See DEMAIN.

DEMETRIA, a feſtival celebrated by the Greeks in honour of Ceres, wherein it was uſual for the devotees to laſh themſelves.

DEMETRIOWITZ, a city of the duchy of Smolenſko, in the Ruſſian empire, ſituated upon the river Ugra, in E. Long. 37. 0. N. Lat. 53. 20.

DEMETRIUS PHALEREUS, a celebrated orator and peripatetic philoſopher, the ſcholar of Theophraſtus. He acquired ſo much authority at Athens, that he governed the city for ten years ; and ruled with ſo much wiſdom and virtue, that they ſet up 36 ſtatues in honour of him. By the ſlanders of ſome malicious perſons, in his abſence, he was, however, condemned to die ; and his images were pulled down : which when Demetrius heard, he ſaid, they could not pull down that virtue for which thoſe images were ſet up. He eſcaped into Egypt, and was protected by Ptolemy Lagus. This king, it is ſaid, aſked his advice concerning the ſucceſſion of his children to the throne ; viz. whether he ought to prefer thoſe he had by Eurydice to Ptolemy Philadelphus whom he had by Berenice ; and Demetrius adviſed him to leave his crown to the former. This diſpleaſed Philadelphus ſo much, that, his father being dead, he baniſhed Demetrius ; who was afterwards killed by the bite of an aſp. Demetrius compoſed more works in proſe and verſe than any other peripatetic of his time ; and his writings conſiſted of poetry, hiſtory, politics, rhetoric, harangues, and embaſſies. None of them are extant except his rhetoric, which is uſually printed among the *Rhetores Selecti*.

DEMETRIUS POLIORCETES, that is, the Taker of Towns, king of Macedonia, was the ſon of Antigonus,

[‡] See *Earthquake*.

gonus, one of the generals and ſucceſſors of Alexander the Great. See (Hiſtory of) Macedonia.

DEMI, a word of the ſame uſe and effect in the French language, with *ſemi* in the Latin and Engliſh, being formed from *dimidium;* and uſed, in compoſition with other words, to ſignify *half.* In words borrowed from the Latins, we uſe *ſemi;* and in thoſe from the French, we retain their *demi.* See Semi.

Demi-culverin, a piece of ordnance uſually 4½ inches bore, 2700 pound weight, ten feet long, and carrying point blank 175 paces.

Demi-culverin *of the leaſt ſize*, is 4¼ inches bore, ten feet long, and 2000 pounds weight. It carries a ball of 4 inches diameter, and of 9 pounds weight, and its level range is 174 paces.

Demi-culverin *of the largeſt ſort*, is 4¾ inches bore, 10⅓ feet long, and weighs 3000 pounds weight. It carries a ball 4½ inches diameter, weighing 12 pounds 11 ounces, point blank 178 paces.

Demi-god. See Hero.

Demi-gorge, in fortification, is that part of the polygon which remains after the flank is raiſed, and goes from the curtin to the angle of the polygon. It is half of the vacant ſpace or entrance into a baſtion.

Demi-quaver, a note in muſic, two of which are equal to a quaver.

Demi-semi-quaver, in muſic, the ſhorteſt note, two of them being equal to a ſemi-quaver.

DEMOCRACY, from δημος, *people*, and κρατειν, to *command* or *govern;* the ſame with a popular government, wherein the ſupreme power is lodged in the hands of the people: ſuch were Rome and Athens of old; but as to our modern republics, Baſil only excepted, their government comes nearer to ariſtocracy than democracy. See Law, n° 14.

DEMOCRITUS, one of the greateſt philoſophers of antiquity, was born at Abdera, a town of Thrace, about the 80th Olympiad; that is, about 460 years before Chriſt. His father, ſays Valerius Maximus, was able to entertain the army of Xerxes; and Diogenes Laertius adds, upon the teſtimony of Herodotus, that the king, in requital, preſented him with ſome Magi and Chaldeans. From theſe Magi and Chaldeans, Democritus received the firſt part of his education; and from them, whilſt yet a boy, he learned theology and aſtronomy. He next applied to Leucippus, and learned from him the ſyſtem of atoms and a vacuum. His father dying, for ſo many there were, divided the eſtate. Democritus made choice of that part which conſiſted in money, as being, though the leaſt ſhare, the moſt convenient for travelling; and it is ſaid, that his portion amounted to above 100 talents, which is near 20,000l. Sterling. His extraordinary inclination for the ſciences and for knowledge, induced him to travel into all parts of the world where he hoped to find learned men. He went to viſit the prieſts of Egypt, from whom he learned geometry; he conſulted the Chaldeans and the Perſian philoſophers; and it is ſaid, that he penetrated even into India and Ethiopia, to confer with the Gymnoſophiſts. In theſe travels, he waſted his ſubſtance; after which, at his return, he was obliged to be maintained by his brother; and if he had not given proofs of the greateſt underſtanding, and thereby procured to himſelf the higheſt honours, and the ſtrongeſt intereſt in his country, he would have incurred the penalty of that law which denied the interment in the family-ſepulchre to thoſe who had ſpent their patrimony. After his return from travelling, he lived at Abdera, and governed there in a moſt abſolute manner, by virtue of his conſummate wiſdom. The magiſtrates of that city made him a preſent of 500 talents, and erected ſtatues to him even in his lifetime: but being naturally more inclined to contemplation, than delighted with public honours and employments, he withdrew into ſolitude and retirement. Democritus inceſſantly laughed at human life, as a continued farce, which made the inhabitants of Abdera think he was mad; on which they ſent for Hippocrates to cure him: but that celebrated phyſician having diſcourſed with the philoſopher, told the Abderians, that he had a great veneration for Democritus; and that, in his opinion, thoſe who eſteemed themſelves the moſt healthy were the moſt diſtempered. Democritus died, according to Diogenes Laertius, in the 361st year before the Chriſtian æra, aged 109. It is ſaid that he blinded himſelf, that he might meditate more profoundly on philoſophical ſubjects; but this has little probability. He was the author of many books, which are loſt; and from theſe Epicurus borrowed his philoſophy.

DEMONSTRABLE, a term uſed in the ſchools, to ſignify that a thing may be clearly proved. Thus, it is demonſtrable, that the three angles of a triangle are equal to two right ones.

DEMONSTRATION, in logic, a ſeries of ſyllogiſms, all whoſe premiſſes are either definitions, ſelf-evident truths, or propoſitions already eſtabliſhed. See Logic, n° 27. 102—113.

DEMONSTRATIVE, in grammar, a term given to ſuch pronouns as ſerve to indicate or point out a thing. Of this number are *hic, hæc, hoc*, among the Latins; and *this, that, theſe, thoſe*, in Engliſh.

DEMOSTHENES, the famous Athenian orator, was born at Athens 381 B. C. He loſt his father at ſeven years of age; and was placed under the conduct of guardians, who robbed him of his ſubſtance, and neglected his education. Demoſthenes repaired this loſs by his love of eloquence and his extraordinary abilities. He became the diſciple of Iſocrates, Plato, and Iſæus; and made ſuch progreſs under thoſe excellent maſters, that, at 17 years of age, he pleaded againſt his guardians, and cauſed them to be ſentenced to pay him 30 talents. This was the firſt time that he diſtinguiſhed himſelf by his eloquence, in which he arrived at the higheſt excellence; though he ſet out under the greateſt diſadvantages. For he had an impediment in his ſpeech, which for a long time would not ſuffer him to pronounce the letter R. He had a weak voice, ſhort breath, and a very uncouth manner. However, by dint of reſolution, and infinite pains, he overcame all theſe defects: See Declamation, N° II. It is univerſally agreed, that no orator ever ſpoke with ſuch force, or had the paſſions of others ſo much in his power, as Demoſthenes. He could dreſs a thing up in any light he pleaſed, and give it whatever colouring beſt anſwered his purpoſe; and that with ſuch force of oratory, as bore down, like a thunder-bolt, all before it. Hence Philip king of Macedon ſaid, his eloquence was of more weight againſt him, than all the fleets and armies of the Athenians; and that he had no enemy but Demoſthenes. After the death of Philip, he oppoſed Alexander the Great; on which account he was obliged to leave the city: but, after the death of that conqueror, he returned to Athens, where he was received in the moſt glorious manner, and continued declaiming againſt the Macedonians. Antipater being informed of this, deſired the Athenians to deliver up to him all the orators who had ſpoken againſt him; on which Demoſthenes withdrew into the iſle of Celauria. Archas coming hither to ſeize him in behalf of Antipater, he pretended a deſire to write to ſome of his friends; and ſucking ſome poiſon he had concealed in a pen, died 322 B. C. Many of his orations are ſtill extant, the ſtyle of which is grand, ſublime, and nervous; and they are all of them maſter-pieces of eloquence.

DEMPSTER (Thomas), a very learned man, but of a ſingular character. He was born in Scotland, but we do not find in what year. He went over to France, for the ſake of embracing the catholic religion; and taught claſſical learning at Paris about the beginning of the 17th century. Tho' his buſineſs was to teach ſchool; yet he was as ready to draw his ſword, and as quarrelſome, as if he had been a duelliſt by profeſſion: and it is ſaid, that there ſcarce paſſed a day but he had ſomething or other of this kind upon his hands. This ſpirit and turn of temper drew him into many ſcrapes; and one in particular, which obliged him to quit the country. Grangier, principal of the College of Beauvais at Paris, being obliged to take a journey, appointed Dempſter his ſubſtitute. Dempſter cauſed whip a ſcholar, in full ſchool, for challenging one of his fellows to fight a duel. The ſcholar, to revenge this affront, brought three gentlemen of his relations, who were of the king's life-guards, into the college. Dempſter made the whole college take arms; hamſtrung the three life-guard-mens horſes before the college gate; and put himſelf into ſuch a poſture of defence, that the three ſparks were forced to aſk for quarter. He gave them their lives; but impriſoned them, and did not releaſe them for ſome days. They ſought another way to revenge themſelves: they cauſed an information to be made of the life and moral behaviour of Dempſter, and got ſome witneſſes to be heard againſt him. Upon this he went over to England, where he found refuge; but did not make any long ſtay. He went abroad again, and read lectures upon polite learning in ſeveral univerſities; in that of Niſmes particularly, where he diſputed for a profeſſor's chair, and obtained it. He went to Bologna, and was profeſſor there for the remainder of his life; and was then alſo admitted a member of the Academy della Rotte. He died there in September 1625, leaving behind him ſeveral learned works; as Commentaries on *Roſinus de Antiquitatibus Romanorum*, and upon Claudian, &c.; four books of Epiſtles; ſeveral dramatic pieces, and other poems; ſome books of law; an Apparatus to the Hiſtory of Scotland; a Martyrology of Scotland; and a Liſt of the Scottiſh Writers.

DEMULCENTS, among phyſicians, medicines good againſt acrimonious humours. Such are the roots of marſh-mallows, of white lilies, of liquorice, and of viper-graſs, the five emollient herbs, *&c.*

DEMURRAGE, in commerce, an allowance made to the maſter of a ſhip by the merchants, for ſtaying in a port longer than the time firſt appointed for his departure.

DEMURRER, in law, a ſtop put to any action upon ſome point of difficulty which muſt be determined by the court, before any further proceedings can be had in the ſuit.

DEN, a ſyllable which, added to the names of places, ſhews them to be ſituated in valleys, or near woods; as Tenterden.

DENARIUS, in Roman antiquity, the chief ſilver coin among the Romans, worth in our money about ſeven-pence three farthings. As a weight, it was the ſeventh part of a Roman ounce.

Denarius is alſo uſed in our law-books for an Engliſh penny.

DENBIGH-shire, a county of Wales, bounded on the ſouth by Merioneth and Montgomery ſhires; on the north by Flintſhire, and the Iriſh ſea; on the weſt by Carnarvon, and part of Merionethſhire. It is about 40 miles long, and 21 broad. The air is wholeſome, but ſharp; the county being pretty hilly, and the ſnow lying long on the tops of the mountains. The ſoil in general is barren; but the vale of Clwyd, ſo called from its being watered by that river, is a very fertile pleaſant ſpot, of great extent, and well inhabited. The chief commodities are black cattle, ſheep, and goats, rye, called here *amelcorn*, and lead-ore. The county ſends two members to parliament, *viz.* a knight for the ſhire, and a burgeſs for Denbigh the capital.

Denbigh, the capital town of Denbigh-ſhire in N. Wales. It is ſeated on the ſide of a rocky hill, on a branch of the river Clwyd, and was formerly a place of great ſtrength, with an impregnable caſtle, now demoliſhed. It is pretty large, well built, and inhabited by tanners and glovers, and gives the title of Earl to the noble family of Fielding. W. Long. 3. 30. N. Lat. 53. 15.

DENDERMOND, a handſome and ſtrong town of the Auſtrian Netherlands, in Flanders, with a ſtrong citadel. It was taken by the allies in 1706, and by the French in 1745. It is ſurrounded by marſhes and fine meadows, which the inhabitants can lay under water when they pleaſe. It is ſeated at the confluence of the rivers Dender and Schelde. E. Long. 4. 3. N. Lat. 51. 3.

DENDRACHATES, in natural hiſtory, the name uſed by the ancients for an extremely elegant and beautiful ſpecies of agate, the ground of which is whitiſh, variegated with veins of a brighter white. Theſe veins are beautifully diſpoſed in a number of various figures; but generally in many concentric irregular circles, drawn round one or more points. It is common alſo, in various parts of this ſtone, to find very beautiful delineations of trees, moſſes, ſea-plants, and the like, ſo elegantly expreſſed, that many have erroneouſly taken them for real plants included in the ſubſtance of the ſtone; whence the name dendrachates.

DENDRANATOMY, a term uſed by ſome for a deſcription of the various parts of trees; as root, trunk, branch, bark, wood, pith, flower, fruit, *&c.* See Plants, Vegetation, *&c.*

DENDROPHORIA, in antiquity, the carrying of boughs or branches of trees; a religious ceremony ſo called, becauſe certain prieſts called from thence *dendrophori*, tree-bearers, marched in proceſſion, carrying the branches of trees in their hands in honour of ſome god, as Bacchus, Cebele, Sylvanus, *&c.* The college of the dendrophori is often mentioned in ancient marbles; and we frequently ſee in baſſo relievos the bacchanals repreſented as men carrying little ſhrubs or branches of trees.

DENEB, an Arabic term ſignifying *tail*, uſed by aſtronomers to denote ſeveral fixed ſtars. Thus, *deneb eleet*, ſignifies the bright ſtar in the lion's tail. *Deneb adigege*, that in the ſwan's tail, *&c.*

DENHAM (Sir John), an eminent Engliſh poet, the only ſon of Sir John Denham, chief baron of the exchequer in Ireland, and one of the lords commiſſioners there, was born in Dublin in 1615; but his father, in 1617, being made a baron of the exchequer in England, he received his education in that country. In his youth he followed gaming more than any thing elſe; but, in 1641, publiſhed a tragedy called the *Sophy*, which was much admired by the beſt judges; and, in 1643, wrote his famous poem called *Cooper's Hill*; which Mr Dryden pronounces will ever be the ſtandard of good writing for majeſty of ſtyle. Denham was ſent ambaſſador from Charles II. to the king of Poland; and at the Reſtoration, was made ſurveyor-general of his majeſty's buildings, and created knight of the Bath. On obtaining this poſt, he is ſaid to have renounced his poetry for more important ſtudies; tho' he afterward wrote a fine copy of verſes on the death of Cowley. He died at his office in Whitehall in 1668; and his works have been often ſince printed.

DENIER, a ſmall French copper-coin, of which twelve make a ſol.

There were two kinds of deniers, the one tournois, the other pariſis, whereof the latter was worth a fourth part more than the former.

DENIZEN, in law, an alien made a ſubject by the king's letters-patent; otherwiſe called *donaiſon*, becauſe "his legitimation proceeds *ex donatione regis*, from the king's gift."

A denizen is in a kind of middle ſtate between an alien and a natural-born ſubject, and partakes of both of them. He may take lands by purchaſe or deviſe, which an alien may not: but cannot take by inheritance; for his parent, through whom he muſt claim, being an alien, had no inheritable blood, and therefore could convey none to the ſon: and, upon a like defect of blood, the iſſue of a denizen born before denization, cannot inherit to him; but his iſſue born after, may. A denizen is not excuſed from paying the alien's duty, and ſome other mercantile burthens. And no denizen can be of the privy council, or either houſe of parliament, or have any office of truſt civil or military, or be capable of any grant of lands, &c. from the crown.

DENMARK, one of the moſt ancient monarchies in Europe, comprehending the peninſula of Jutland, and the iſlands of Zeland, Tunen, &c. But Denmark, properly ſo called, is only that part of Scandinavia which formerly went by the name of *Cimbrica Cherſoneſus*, and now is called *Jutland*. Including Holſtein, it is bounded by the ſea called the *Categate* on the north; by the Baltic on the eaſt; by the river Elbe, which ſeparates it from Bremen, on the ſouth; and by the duchy of Saxe-Lawenburg towards the ſouth-eaſt; extending from 54. 40. to 58. 20. N. Lat.

1 Name whence derived.

The origin of the name *Denmark* is very uncertain. The moſt probable conjecture concerning it is that of *Saxo-Grammaticus*, the moſt ancient and beſt Daniſh hiſtorian. He derives it from *Dan* the ſon of *Humble*, the firſt king, and *Mark*, or *Marc*, ſignifying a country in ſeveral dialects of the Teutonic; according to which etymology, the word *Denmark* ſignifies the land, or country, of *Dan*.—This Dan is thought to have lived about 1038 years before the Chriſtian æra. Almoſt all hiſtorians agree that he was the ſon of *Humble*, a native of Zealand. His poſſeſſions and influence were very conſiderable, not only in Zealand, but in the iſlands of Langland and Mona. It was his courage, however, and ſkill in the art of war, that induced the inhabitants of Denmark to chooſe him for their king. He was called to the aſſiſtance of the Jutlanders upon an irruption of the Saxons into their territories, and promiſed the ſovereignty of the country if he drove out the enemy. On this he immediately raiſed an army, gained a complete victory over the Saxons, and obliged them to leave the country; and he was accordingly elected king.

2 Dan the firſt king.

3 Hiſtory of this country fabulous for many ages.

In ſuch early ages as theſe, we are not to look for any authentic hiſtory either of this or any other kingdom. The hiſtory of Denmark, for a great number of ages after the reign of *Dan*, is filled with fabulous exploits of heroes, encounters with giants, dragons, &c. One of their kings named *Frotho*, who reigned about 761 years before Chriſt, is ſaid to have conquered all Britain, Sleſwick, Ruſſia, Pomerania, Holſtein, &c.; an aſſertion which cannot eaſily be credited, conſidering the difficulty which ſucceeding warriors, even the greateſt in the world, found to ſubdue the inhabitants of thoſe countries.—It is certain, however, that anciently the kingdom of Denmark made a much more conſpicuous figure than it does at preſent. The Danes appear to have had a very conſiderable naval force almoſt from the foundation of their empire; and the conqueſts they undoubtedly made in our iſland, are certain proofs of their valour.

4 Valdemar I. a great monarch.

The natural enemies of the Danes were the Swedes, Norwegians, and Saxons; eſpecially the firſt. With one or other of theſe nations almoſt perpetual war was carried on. The kingdom was alſo often rent by civil diſſenſions; which the neighbouring monarchs did not fail to take advantage of, in order to reduce the kingdom of Denmark under their ſubjection. As neither party, however, generally came off with advantage, the hiſtory of theſe wars affords nothing intereſting or entertaining.—One of the greateſt of the Daniſh monarchs was *Valdemar* I. who obtained the throne in 1157; having defeated and killed his competitor *Swen*, after a ten years civil war. He maintained a long war with the Vandals, whoſe power he at laſt entirely broke, and reduced under his ſubjection the iſland of Rugen. He alſo proved victorious over the Norwegians, ſo that their king and queen came in perſon to ſubmit to him. In 1165, he alſo laid the foundations of the city of Dantzic: which, though it hath ſince become a place of ſuch conſequence, conſiſted at firſt only of a few poor fiſhermens huts; but the privileges and immunities conferred upon it by this monarch, ſoon proved the means of its becoming a flouriſhing city.—In 1169, he entirely ſubdued the Courlanders; and, ſoon after, was inveſted with the duchy of Holſtein, by the emperor Frederic Barbaroſſa. He is ſaid to have been poiſoned by a quack medicine, given with a deſign to recover him from a diſtemper with which he was ſeized in 1182.

5 Power of Denmark in 1195.

In the year 1195, Canute, Valdemar's ſucceſſor, cauſed a muſter to be made of all the men fit to bear arms in his dominions; and ordered each province to fit out its proportion of ſhipping, every way equipped, and ready for action. The whole force of Denmark, at that time, conſiſted of 670 ſhips of war, beſides the ſquadrons ſupplied by vaſſals, tributary ſtates, and allies. The number of the land-forces is not mentioned. In the reign of this prince, the Daniſh dominions were enlarged by the entire conqueſt of Stromar; the diſtricts of Lubec and Hamburgh, formerly known by the name of *Nordalbingia*, but now included under the general name of *Holſtein*. He died in 1203, and was ſucceeded by Valdemar II. who proved a very great and warlike prince. In 1211, he founded the city of Stralſund, oppoſite to the Iſle of Rugen. The ſame year, his queen died in child-bed; and in memory of her he built the caſtle of *Droningholm*, that name importing the *Queen's iſland*.

6 Expedition of Valdemar II. againſt the Livonians.

In 1218, he undertook an expedition againſt the Livonians, having received advice that they, aſſiſted by the Lithuanians, Muſcovites, and other barbarous nations, had driven from their habitations all thoſe in their neighbourhood who had embraced Chriſtianity, and taken an oath of allegiance to the crown of Denmark. Fitting out a powerful fleet, therefore, he immediately ſet ſail for that country; but his troops were no ſooner landed, than they were ſeized with a panic, at the ſight of ſuch a powerful army of ſavages as were aſſembled to oppoſe them. The king himſelf was diſmayed at the unuſual ſpectacle of a whole army clothed in ſkins, and reſembling beaſts more than human creatures. Encouraged, however, by the biſhops who attended him, he ventured an engagement, and overthrew the Barbarians with incredible ſlaughter. This victory was gained near the fortreſs of *Valdemar*, which received its name on that account.

7 Flouriſhing ſtate of the kingdom.

How potent and flouriſhing the kingdom of Denmark was at this time, appears from an eſtimate of the revenues of the tributary provinces, thoſe countries conquered by Valdemar, and the ſtanding forces of the whole kingdom. This account was copied by Pontanus from Witfeld a writer of thoſe days, who had it from a regiſter kept by Valdemar's ſteward. From the provinces were daily ſent in 24 laſts of oats, 24 laſts of rye and half that quantity of wheat, 13 *talents* of cheeſe and butter, and nine of honey; 24 oxen, 300 ſheep, 200 hogs; and 600 marks of coined money. This was the certain revenue: but to this was added near an equal ſum from adventitious circumſtances; ſuch as fines, forfeitures, taxes on law-ſuits and pleadings, with a variety of other contingencies; the whole amounting to above 100,000 marks a-day, or 23,730,000 l. *per annum*; a ſum in thoſe days almoſt incredible.—With this revenue were kept for conſtant ſervice 1400 great and ſmall ſhips for the king's uſe, each of which at a medium carried 121 ſoldiers; making the whole of the ſtanding forces, beſides gariſons, conſiſt of 169,400 fighting men.

8 Valdemar taken priſoner.

In 1223, a very great misfortune befel Valdemar, notwithſtanding all his power. Henry earl of Swerin, otherwiſe called *Henry Palatine*, a German prince, having been deprived of part of his dominions by Valdemar, ſurpriſed and carried off the king himſelf, and kept him cloſe priſoner for three years. The conditions on which he at laſt obtained his liberty, were very hard. He was obliged to pay a prodigious ſum of money; to relinquiſh Holſtein, Swerin, Hamburgh, and all his poſſeſſions on the other ſide of the Elbe; and laſtly, ſolemnly to ſwear that he would maintain this compulſive contract, and never take any meaſures to puniſh Henry or his aſſociates. This treaty was ſigned on the 25th of March 1226.

9 Releaſed on condition of ceding part of his territories.

10 He breaks the treaty, but is defeated.

Beſides theſe territories which the Daniſh monarch had been obliged to cede by treaty, many tributary princes took the opportunity of his captivity, to recover their liberty; and among the reſt, the inhabitants of Lubec revolted, and entered into alliance with Albert duke of Saxony againſt Valdemar. The latter, however, was not of a diſpoſition to ſubmit tamely to ſuch treatment. He obtained a diſpenſation from the Pope to break his engagements with Henry, and immediately entered Holſtein at the head of a numerous army. Here he was met by ſeveral German princes, at the head of a very numerous army; and a deſperate engagement enſued. Valdemar at firſt had the advantage; but being wounded in the eye, his troops were at laſt defeated with great ſlaughter. It doth not appear, that ever the king of Denmark was able to revenge himſelf of his enemies, or to recover the dominions he had loſt. So far from this, he was obliged, in 1228, to cede Lawenberg to the duke of Saxony, who had already ſeized on Ratzburg and Molna. Soon after this, his eldeſt ſon Valdemar was accidentally killed as he was hunting, and his two other ſons married the daughters of his two greateſt enemies. Abel, the third ſon, married the daughter of Adolphus duke of Holſtein; and Eric, the ſecond, married the duke of Saxony's daughter. Theſe misfortunes are ſuppoſed to have haſtened his death, which happened in the month of April 1242.

11 Civil war between his two ſons.

On the death of Valdemar, the kingdom was divided between the two young princes; and between them a war commenced the very next year. A peace was concluded the year following, and war renewed the year after; but how long it continued, we are not informed. In 1250, Eric paid a viſit to his brother Abel, intreating his mediation between him and the princes of Holſtein, with whom he was then at war. Abel received him, in appearance, with great kindneſs, and promiſed that his utmoſt endeavours to procure a reconciliation ſhould not be wanting; but in the mean time, laid a plan for having him murdered at ſea: this was effected, and Abel became maſter of the whole kingdom.

12 Kingdom divided among a number of petty tyrants.

The new king did not long enjoy the ſovereignty he had ſo wickedly obtained. He was tormented by his own conſcience; eſpecially when he found, among his brother's papers, one by which he was left heir to the whole kingdom on the deceaſe of Eric, and many kind expreſſions with regard to himſelf. He was at laſt killed in a battle with his own ſubjects, in 1252; on account of ſome taxes he intended to impoſe.

From this time to the year 1333, the kingdom of Denmark gradually declined. Uſurpers eſtabliſhed themſelves in different provinces; while the kings of Sweden did not fail to avail themſelves of the diſtracted

ted ſtate of the Daniſh affairs. In 1333, died Criſtopher II. who poſſeſſed only the cities of Scanderburg in Jutland, and Neoburg in Fionia; with ſome few other inconſiderable places, of all the hereditary dominions of Denmark. Halland, Holbec, Calemburg, and Samſoe, were held by Canute Porſius; Schonen, Lyſtre, and Bleking, by the king of Sweden, to whom they had been lately ſold: John, earl of Wagria, had the juriſdictions of Zealand, Falſtre, Laaland, and Femerin; Gerhard of Jutland and Fionia; and Lawrence Jonea of Lang-land and Arras.

After the death of Chriſtopher, an interregnum of ſeven years enſued.—The firſt attempt for the ſovereignty was made by Otho, ſecond ſon to the late king, who laid a ſcheme for driving Gerhard out of Jutland; but not being able to accompliſh it, he was taken priſoner, and cloſely confined by Gerhard.—The king of Sweden next wrote to Pope Benedict XIII. beſeeching his Holineſs to confirm to him the provinces of Schonen and others which he poſſeſſed; and to allow him to ſubdue the reſt of the kingdom, which was now uſurped and rendered miſerable, by a ſet of petty princes, who knew not how to govern. To influence him the more powerfully, he alſo promiſed to hold this kingdom of the Pope; and to pay him the uſual tax collected by the church. This requeſt, however, was refuſed.—Valdemar of Sleſwic, nephew to Gerhard, then aſpired to the ſovereignty. He had formerly been elected king; but had given over all thoughts of enjoying the ſovereignty, on account of the ſuperior influence of Chriſtopher; but now reſumed his ambitious views, at the inſtigation of his uncle. Several of the nobility alſo caſt their eyes on young Valdemar Chriſtopher's ſon, now at the emperor's court. But, while each of theſe princes were laying ſchemes to aggrandiſe themſelves, the unhappy Danes were diſtreſſed by exorbitant taxes, famine, and peſtilence; the two laſt, in conſequence of the former. The peaſants neglected to cultivate the lands, which they held on a very precarious tenure; the conſequence of this was poverty, and an unwholeſome diet; and this, co-operating with the peculiar diſpoſition of the air, produced a plague, which deſtroyed more than half the inhabitants of the country. The poor dropped down dead on the ſtreets with diſeaſe and hunger, and the gentry themſelves were reduced to a ſtate of wretchedneſs; yet, though the whole kingdom was evidently on the verge of ruin, ambitious projects employed the great, as if every thing had been in the moſt profound tranquillity.

13
Diſtreſſed
ate of the
ingdom.

In the midſt of theſe grievous calamities, Gerhard, ſovereign of Jutland, propoſed to his nephew Valdemar an exchange of territories, which he believed would prove favourable to the deſigns of the latter on the crown. A treaty for this purpoſe was actually drawn up and ſigned; but the inhabitants, notwithſtanding their diſtreſſed ſituation, ſo highly reſented their being diſpoſed of like cattle, from one maſter to another, that they refuſed to pay the uſual taxes. Gerhard reſolved to compel them; and therefore led 10,000 men, whom he had levied in Germany, into the heart of the province. Providence, however, now raiſed up an enemy to this tyrant. One Nicholas Norevi, a man greatly eſteemed for his courage, public ſpirit, and prudence, beheld with ſorrow the condition to which Denmark was reduced. He had long meditated a variety of projects for its relief, and at laſt imagined things were in ſuch a ſituation that the whole depended on his ſingle arm. Young Valdemar, Chriſtopher's ſon, had a number of adherents in the kingdom; his moſt dangerous enemy was Gerhard; and could he be removed, the Jutlanders would at leaſt be free from an oppreſſor, and might chooſe Valdemar, or any other they thought proper, for their ſovereign. Collecting a body of choſen horſe, therefore, he marched in the night to Randerſhuſen, where Gerhard had fixed his head-quarters; and having forced open the tyrant's quarters, immediately put him to death. He then fled with the utmoſt expedition; but was purſued and overtaken by a party of the enemy's horſe, through which he forced his way and eſcaped. Gerhard's ſons, hearing of his death, retired into Holſtein from whence they had come; leaving the army, compoſed chiefly of Holſteiners, to be cut in pieces by the enraged peaſants, who fell upon them from every quarter.

14
cholas
revi re
ers the
rty of
land.

Still, however, the Holſteiners kept poſſeſſion of the citadels and fortified places, from whence Nicholas reſolved to diſlodge them. He accordingly raiſed a body of forces; attacked and took Landen, a caſtle ſituated on the river Scherne: after which he laid ſiege to Alberg; but the garriſon making an obſtinate defence, he turned the ſiege into a blockade, by which they were ſoon reduced to great extremity. The governor ſent an expreſs to the ſons of Gerhard, acquainting them with the impoſſibility of his holding out more than a few days, without being relieved. This determined them to march to the relief of ſo important a place. They came up with Nicholas juſt as the governor was ready to ſurrender, but were defeated; though Nicholas was unfortunately killed in the engagement.

15
He is killed.

Jutland having thus regained its liberty, the reſt of the kingdom followed its example. Zealand firſt openly declared itſelf. Here Henry, Gerhard's ſon, maintained ſeveral garriſons; and reſolved to defend his poſſeſſions in ſpite of all the power of the inhabitants. For this purpoſe he drew together an army; but, in the mean time, a tumult aroſe among the peaſants on account of a Daniſh nobleman ſlain by the Holſteiners. By this the people were at laſt ſo irritated, that, falling upon the Holſteiners ſword in hand, they killed 300 of them; drove the reſt out of the iſland; and choſe Valdemar, Chriſtopher's ſon, for their ſovereign.

The Danes now reſumed their courage; the lands were cultivated, the famine and peſtilence ceaſed, and the kingdom began to flouriſh as formerly. Matters continued in a proſperous way till 1387, when Margaret mounted the throne. She raiſed the kingdom to its higheſt pitch of glory, as partly by her addreſs, and partly by hereditary right, ſhe formed the union of Calmar, by which ſhe was acknowledged ſovereign of Sweden, Denmark, and Norway. She held her dignity with ſuch firmneſs and courage, that ſhe was juſtly ſtiled the *Semiramis of the North*. Her ſucceſſors being deſtitute of her great qualifications, the union of Calmar fell to nothing: but Norway ſtill continued annexed to Denmark. About the year 1448, the crown of Denmark fell to Chriſtian, count of Oldenburg, from whom the preſent royal family of Denmark is deſcended; and, in 1536, the proteſtant religion was eſta-

16
Margaret unites the crowns of Denmark, Sweden, and Norway.

eſtabliſhed in Denmark, by that wiſe and politic prince Chriſtian III.

Chriſtian IV. of Denmark, in 1629, was choſen for the head of the Proteſtant league, formed againſt the houſe of Auſtria: but, though brave in his own perſon, he was in danger of loſing his dominions; when he was ſucceeded in that command by the famous Guſtavus Adolphus, king of Sweden. The Dutch having obliged Chriſtian, who died in 1648, to lower the duties of the Sound, his ſon Frederic III. conſented to accept of an annuity of 150,000 florins for the whole. The Dutch, after this, perſuaded him to declare war againſt Charles Guſtavus, king of Sweden, which had almoſt coſt him his crown in 1657. Charles ſtormed the fortreſs of Fredericſtadt; and in the ſucceeding winter, he marched his army over the ice to the iſland of Funen, where he ſurpriſed the Daniſh troops, took Odenſee and Nyburg and marched over the Great Belt to beſiege Copenhagen itſelf. Cromwell, the Engliſh uſurper interpoſed: and Frederic defended his capital with great magnanimity, till the peace of Roſchild; by which Frederic ceded the provinces of Halland, Bleking, and Sconia, the iſland of Bornholm, Bahus, and Drontheim, in Norway, to the Swedes. Frederic ſought to elude thoſe ſevere terms; but Charles took Cronenburg, and once more beſieged Copenhagen by ſea and land. The ſteady intrepid conduct of Frederic under theſe misfortunes, endeared him to his ſubjects; and the citizens of Copenhagen made an admirable defence, till a Dutch fleet arrived in the Baltic, and beat the Swediſh fleet. The fortune of war was now entirely changed in favour of Frederic. who ſhewed on every occaſion great abilities, both civil and military; and having forced Charles to raiſe the ſiege of Copenhagen, might have carried the war into Sweden, had not the Engliſh fleet, under Montague, appeared in the Baltic. This enabled Charles to beſiege Copenhagen a third time: but France and England offering their mediation, a peace was concluded in that capital; by which the iſland of Bornhold returned to the Danes; but the iſland of Rugen, Bleking, Halland, and Schonen, remained with the Swedes.

17
Several provinces ceded to Sweden.

18
Perpetual wars with that kingdom.

Though this peace did not reſtore to Denmark all ſhe had loſt, yet the magnanimous behaviour of Frederic, under the moſt imminent dangers, and his attention to the ſafety of his ſubjects, even preferably to his own, endeared him ſo much in their eyes, that they rendered him abſolute. Frederic was ſucceeded, in 1670, by his ſon Chriſtian V. who obliged the duke of Holſtein Gottorp to renounce all the advantages he had gained by the treaty of Roſchild. He then recovered a number of places in Schonen; but his army was defeated in the bloody battle of Lunden, by Charles XI. of Sweden. This defeat did not put an end to the war; which Chriſtian obſtinately continued, till he was defeated entirely at the battle of Landſcroon; and he had almoſt exhauſted his dominions in his military operations, till he was in a manner abandoned by all his allies, and forced to ſign a treaty on the terms preſcribed by France, in 1679. Chriſtian, however, did not deſiſt from his military attempts; and at laſt he became the ally and ſubſidiary of Lewis XIV. who was then threatening Europe with chains. Chriſtian, after a vaſt variety of treating and fighting with the Holſteiners, Hamburghers, and other northern powers, died in 1699. He was ſucceeded by Frederic IV. who, like his predeceſſors, maintained his pretenſions upon Holſtein; and probably muſt have become maſters of that duchy, had not the Engliſh and Dutch fleets raiſed the ſiege of Tonningen; while the young king of Sweden, Charles XII. who was no more than 16 years of age, landed within eight miles of Copenhagen, to aſſiſt his brother-in-law the duke of Holſtein. Charles probably would have made himſelf maſter of Copenhagen, had not his Daniſh majeſty agreed to the peace of Travendahl, which was entirely in the duke's favour. By another treaty con concluded with the States-General, Frederic obliged himſelf to furniſh a body of troops, who were to be paid by the confederates; and who afterwards did great ſervice againſt the French.

Notwithſtanding this peace, Frederic was perpetually engaged in wars with the Swedes; and while Charles was an exile at Bender, he marched through Holſtein into Swediſh Pomerania; and in the year 1712, into Bremen, and took the city of Stade. His troops, however, were totally defeated by the Swedes at Gadeſbuſch, who laid his favourite city of Altena in aſhes. Frederic revenged himſelf, by ſeizing great part of the ducal Holſtein, and forcing the Swediſh general, count Steinbock, to ſurrender himſelf priſoner, with all his troops. In the year 1716, the ſucceſſes of Frederic was ſo great, by taking Tonningen and Stralſund, by driving the Swedes out of Norway, and reducing Wiſmar and Pomerania, that his allies began to ſuſpect he was aiming at the ſovereignty of all Scandinavia. Upon the return of Charles of Sweden from his exile, he renewed the war againſt Denmark, with a moſt embittered ſpirit; but on the death of that prince, who was killed at the ſiege of Fredericſhal, Frederic durſt not refuſe the offer of his Britannic majeſty's mediation between him and the crown of Sweden; in conſequence of which, a peace was concluded at Stockholm, which left him in poſſeſſion of the duchy of Sleſwic. Frederic died in the year 1730, after having, two years before, ſeen his capital reduced to aſhes, by an accidental fire. His ſon and ſucceſſor, Chriſtian Frederic, made no other uſe of his power, and the advantages with which he mounted the throne, than to cultivate peace with all his neighbours, and to promote the happineſs of his ſubjects, whom he eaſed of many oppreſſive taxes.

In 1734, after guarantying the Pragmatic Sanction, Chriſtian ſent 6000 men to the aſſiſtance of the emperor, during the diſpute of the ſucceſſion to the crown of Poland. Though he was pacific, yet he was jealous of his rights, eſpecially over Hamburgh. He obliged the Hamburghers to call in the mediation of Pruſſia, to aboliſh their bank, to admit the coin of Denmark as current, and to pay him a million of ſilver marks. He had, two years after, viz. 1738, a diſpute with his Britannic majeſty, about the little lordſhip of Steinhorſt, which had been mortgaged to the latter by the duke of Holſtein Lawenburg, and which Chriſtian ſaid belonged to him. Some blood was ſpilt during the conteſt; in which Chriſtian, it is thought, never was in earneſt. It brought on, however, a treaty, in which he availed himſelf of his Britannic majeſty's predilection for his German dominions;

19
An advan tageous treaty wi Great Bri tain.

nions; for he agreed to pay Chriſtian a ſubſidy of 70,000 *l.* Sterling a-year, on condition of keeping in readineſs 7000 troops for the protection of Hanover: this was a gainful bargain for Denmark. And two years after, he ſeized ſome Dutch ſhips, for trading without his leave, to Iceland: but the difference was made up by the mediation of Sweden. Chriſtian had ſo great a party in that kingdom, that it was generally thought he would revive the union of Calmar, by procuring his ſon to be declared ſucceſſor to his then Swediſh majeſty. Some ſteps for that purpoſe were certainly taken: but whatever Chriſtian's views might have been, the deſign was fruſtrated by the jealouſy of other powers, who could not bear the thoughts of ſeeing all Scandinavia ſubject to one family. Chriſtian died in 1746, with the character of being the father of his people.

His ſon and ſucceſſor, Frederic V. had, in 1743, married the princeſs Louiſa, daughter to his Britannic majeſty. He improved upon his father's plan, for the happineſs of his people; but took no concern, except that of a mediator, in the German war. For it was by his intervention, that the treaty of Cloſter-ſeven was concluded between his royal highneſs the late duke of Cumberland, and the French general Richlieu. Upon the death of his firſt queen, who was mother to his preſent Daniſh majeſty, he married a daughter of the duke of Brunſwic Wolfenbuttel; and died in 1766. He was ſucceeded by his ſon Chriſtian VII. his preſent Daniſh majeſty, who married the princeſs Carolina Matilda of England.

20 iviſion of e kingom.

The kingdom of Denmark at preſent is divided into ſix grand diſtricts or provinces; *viz.* 1. Denmark properly ſo called, comprehending the iſlands of Zealand, Funen, Langland, Laaland, Falſtria, Mona, Samſoe, Arroe, Bornholm, Anhoult, Leſſaw, and that part of the continent called *North Jutland.* 2. The dutchy of Sleſwick, or South Jutland. 3. The duchy of Holſtein. 4. The earldoms of Oldenburg and Delmenhorſt. 5. The kingdom of Norway; and 6. Iceland, with the iſlands lying in the Northern Seas; for a particular deſcription of which ſee theſe articles.

21 anguage, ligion,

The language of Denmark is a dialect of the Teutonic, and bears a ſtrong affinity to the Norwegian tongue; but is diſagreeable to ſtrangers, on account of the drawling tone with which it is pronounced. They have borrowed many words from the Germans; and, indeed, the high Dutch is uſed in common diſcourſe by the court, the gentry, and the burghers. The better ſort likewiſe underſtand French, and ſpeak it fluently. The Lutheran doctrine is univerſally embraced through all Denmark, Sweden, and Norway; ſo that there is not another ſect in theſe kingdoms. Denmark is divided into ſix dioceſes, one in Zealand, one in Funen, and four in Jutland: but the biſhops are, properly ſpeaking, no other than ſuperintendants, or *primi inter pares.* They have no cathedrals, eccleſiaſtical courts, or temporalities. Their buſineſs is to inſpect the doctrine and morals of the inferior clergy. The revenue of the biſhop of Copenhagen amounts to about 2000 rixdollars; and this is the richeſt benefice in the kingdom. The clergy are wholly dependant on the government. They never intermeddle, nor are employed or conſulted in civil affairs. They, nevertheleſs, have acquired great influence, and erected a ſort of ſpiritual tyranny over the minds of the common people, by whom they are much revered. They are, generally ſpeaking, men of exemplary lives, and ſome erudition. Their churches are kept more clean, and better adorned, than thoſe of England: the people are great lovers of muſic, and their organiſts commonly entertain the congregation for half an hour before or after ſervice. The ſtate of literature is very low in Denmark. There is, indeed, an univerſity at Copenhagen; but meanly endowed, and very ill ſupplied with maſters. Taſte and the belles lettres are utterly unknown in this country, which yet has produced ſome men of great eminence in mathematics and medicine; ſuch as Tycho Brahe, Borrichius, and the Bartholines.

22 Government.

The conſtitution of Denmark was heretofore of the free Gothic original. The convention of the eſtates, even including the repreſentatives of the boors or peaſants, elected a king for his perſonal virtues, having ſtill a regard to the ſon of their late monarch, whom, however, they made no ſcruple of ſetting aſide, if they deemed him unworthy of the royal dignity. They enacted laws; conferred the great offices of ſtate; debated all affairs relating to commerce, peace, war, and alliances; and occaſionally gave their conſent to the impoſition of neceſſary taxes. The king was no other than chief magiſtrate, generaliſſimo, and as it were prime miniſter to his people. His buſineſs was to ſee juſtice adminiſtered impartially; to command the army in time of war; to encourage induſtry, religion, arts, and ſciences; and to watch over the intereſts of his ſubjects. Such was the conſtitution of Denmark, till the year 1660, when it underwent a very ſtrange and ſurpriſing revolution.

23 King, how rendered abſolute.

At that time peace was concluded with Sweden, and the nation reſounded with the clamour of miſery and diſcontent. There was nothing left in the public treaſury, to pay off and diſband the army; which therefore became inſolent and licentious. The common people, and even the burghers, had been exhauſted by the long, expenſive war: the clergy were unſatiſfied with their condition and want of importance; and the nobility were become proud and tyrannical. When the eſtates aſſembled to deliberate and redreſs the grievances of the nation, the commons propoſed that an equal tax ſhould be laid upon all perſons, without diſtinction, in proportion to their circumſtances. The nobles pleaded their privilege of being exempted from all impoſition. The burghers alleged, that as the nobility engroſſed all the lands and riches in the kingdom, it was reaſonable that they ſhould bear their ſhare of the common burden. Violent diſputes enſued. At length a nobleman, called *Otto Craeg*, ſtood up, and in a tranſport of paſſion told the commons, that they neither underſtood the privileges of the nobility, who were always exempted from ſuch impoſitions, nor the condition of themſelves, who were no other than their *ſlaves*. This inglorious term produced an immediate ferment in the aſſembly; and the hall reſounded with murmurs and altercation. Nanſon, ſpeaker of the commons, ſtarting up in a rage of indignation, ſwore that the nobility ſhould repent their having branded the commons with ſuch an opprobrious epithet. He had previouſly concerted the deſign with the biſhop of Copenhagen, and the court was not ignorant of their intention. The clergy and burghers, Denmark.

breaking up in diſorder, marched, under the auſpices of theſe leaders, to the brewer's hall; where, after much debate, they agreed to make a ſolemn tender of their freedom and ſervices to the king, that he might become abſolute monarch of the realm, and ſee the right of hereditary ſucceſſion eſtabliſhed in his family. Next morning they marched in couples, each burgher being paired with a clergyman, through the ſtreets, which were filled with the populace, who ſhouted as they paſſed, to the council-hall, where the nobles had re-aſſembled. There Nanſon, in a ſhort harangue, ſignified the intention of the clergy and commons, demanded the concurrence of the nobles, and threatened, that, in caſe of a refuſal, they would forthwith proceed without them to the palace. The nobles were confounded and abaſhed. They endeavoured to gain time: they profeſſed a deſire of concuring with the other ſtates; but deſired that an affair of ſuch conſequence might not be precipitated. The others being deaf to their remonſtrances and intreaties, continued their proceſſion to the palace; where they were met by the prime miniſter, who conducted them to the hall of audience. There the biſhop of Copenhagen, in a florid ſpeech, as deputy from the two orders, made a ſolemn tender to the king of an abſolute and hereditary dominion; aſſuring his majeſty, that he might command their purſes and arms, to ſupport a meaſure ſo neceſſary to the welfare of his people. The king received them graciouſly, aſſented to the propoſal, thanked them for their zeal and confidence, and aſſured them they might depend upon his royal favour and protection. The city-gates were immediately ſhut, that none of the ſenators ſhould eſcape: a precaution by which the nobles were ſo intimidated, that they ſignified their readineſs to concur with the ſtep which the other two orders had taken. Preparations were forthwith made for this ſtrange inauguration. Scaffolds were raiſed in the open ſpace before the caſtle; and the troops and burghers received orders to appear in arms, under their reſpective officers. On the 16th day of October, in the year 1660, the king, queen, and royal family, aſcended an open theatre; and placing themſelves on chairs of ſtate, under canopies of velvet, received in public the homage of all the ſenators, nobility, clergy, and commons, couched in an oath of allegiance compoſed for the purpoſe. Thus the people, with a raſh and deſperate hand, from motives of revenge, fomented by an artful miniſtry and ambitious clergy, reſigned their liberty and independence, and inveſted their ſovereign with a deſpotic power over their lives and fortunes. The king of Denmark is now ſo abſolute, that he not only can impoſe what tolls and taxes he ſhall think convenient; but alſo, by a maxim in the preſent juriſprudence of that nation, he enjoys the prerogative of explaining the law, and even of altering it occaſionally.

24
Laws, &c.

The laws of Denmark are ſo conciſe, that the whole body is contained in one quarto volume, written in the language of the country. Every man may plead his own cauſe, without employing either council or attorney: but there are a few advocates for the benefit of thoſe who cannot or will not ſpeak in their own defence. The proceedings are ſo ſummary, that a ſuit may be carried through all the courts, and finally decided, in 13 months. There are three courts in Denmark, and an appeal lies from the inferior to the ſuperior tribunal. The loweſt of theſe is, in cities and towns, denominated the *Byſoglids Court;* and in the country, the *Herredsſougds.* Cauſes may be appealed from this to the *Landſtag*, or general head-court for the province: but the final appeal lies to the court of *High-right* in Copenhagen, where the king preſides in perſon, aſſiſted by the prime nobility. The judges of the two other courts are appointed by his majeſty's letters patent, to ſit and determine cauſes *durante bene placito*. Theſe are puniſhable for any miſdemeanours of which they may be guilty; and when convicted of having paſſed an unjuſt ſentence, they are condemned to make reparation to the injured party. Their ſalaries are very inconſiderable, and paid out of the king's treaſury, from the fines of delinquents, beſides a ſmall gratuity from the plaintiff and defendant when ſentence is paſſed. Such is the peculiar privilege enjoyed by the city of Copenhagen, that cauſes appealed from the Byſoglids court, inſtead of paſſing through the provincial court, are tried by the burgomaſter and common-council; from whence they proceed immediately to the higheſt court, as the laſt reſource. Affairs relating to the revenue are determined in the rent-chamber of Denmark, which is analogous to our court of exchequer. To another tribunal, compoſed of ſome members from this rent-chamber, from the admiralty, and college of commerce, merchants appeal for redreſs, when their commodities are ſeized for non-payment of duties. All diſputes relating to the ſea are determined by the court of admiralty, conſtituted of commiſſioners appointed for theſe purpoſes. The chancellary may be more properly termed a *ſecretary's office*. It conſiſts of clerks, who write and iſſue all the king's decrees and citations, tranſcribe papers, and, according to the directions they receive, make draughts of treaties and alliances with other nations. The government of Denmark is very commendable for the excellent policy it maintains. Juſtice is executed upon criminals with great ſeverity; and ſuch regulations are eſtabliſhed as effectually prevent thoſe outrages that are daily committed in other countries. No man preſumes to wag his tongue againſt the government, far leſs to hatch ſchemes of treaſon. All the ſubjects are, or ſeem to be, attached to their ſovereign by the ties of affection. Robbery on the high-way, burglary, coining or clipping, are crimes ſeldom or never heard of in Denmark. The capital crimes uſually committed are theft and manſlaughter. Such offenders are beheaded very dexterouſly with one ſtroke of a ſword. The executioner, though infamous, is commonly rich; becauſe, over and above the functions of his office, he is employed in other ſcandalous occupations, which no other perſon will undertake. He, by means of his underſtrapper, called the *pracher*, empties all the jakes, and removes from houſes, ſtables, or ſtreets, dead dogs, horſes, &c. which no other Dane will vouchſafe to touch on any conſideration whatſoever.

In Copenhagen there is a maſter of the police, who ſuperintends the œconomy of that city. No torches are allowed to be carried through the ſtreets of this city, becauſe great part of the houſes are of timber, and the wind is generally high. In lieu of flambeaux, the court and quality uſe large round lanthorns, fixed to the end of long poles. In a word, the maſter of the police regulates every thing that relates to the decency, good order, quiet, and ſecurity, of the capital. The apothecaries in this kingdom are under excellent regulations: their number at Copenhagen is reſtricted to two; and one is allowed to every other town of importance. They are examined and appointed by the college of phyſicians, and confirmed by the king himſelf; otherwiſe they cannot exerciſe the profeſſion. Their ſhops are viſited three times a-year by the magiſtrates, accompanied with phyſicians, who inſpect their medicines and regulate the prices. They are obliged to keep an exact account of every thing they ſell, to ſpecify the name of the perſon who bought it, and that of the doctor by whom it was preſcribed; ſo that accidents are prevented, and murders by poiſon eaſily diſcovered.

22
Slaviſh condition of the Daniſh ſubjects.

The Daniſh nobility and gentry are all included in the term *nobleſſe;* and formerly there were no diſtinctions of title: but, within theſe 60 or 70 years, ſome few favourites have been dignified with the titles of *count* and *baron*. Theſe, and theſe only, enjoy the privilege of diſpoſing of their eſtates by will; though others may make particular diſpoſitions, provided they have ſufficient intereſt to procure the king's approbation and ſignature. The nobleſſe of Denmark formerly lived at their own ſeats with great magnificence; and at the conventions of eſtates met the king with numerous and ſuperb retinues: but ſince he became abſolute, they are ſo impoveriſhed by exorbitant taxes, that they can hardly procure ſubſiſtence; and, for the moſt part, live obſcurely in ſome corner of their ruined country palaces, unleſs they have intereſt enough to procure ſome employment at court. They no longer inherit the ſpirit and virtues of their anceſtors; but are become ſervile, indolent, oſtentatious, extravagant, and oppreſſive.

Their general character is a ſtrange compoſition of pride and meanneſs, inſolence and poverty. If any gentleman can find a purchaſer for his eſtate, the king, by the Daniſh law, has a right to one third of the purchaſe-money: but the lands are ſo burdened with impoſitions that there would be no danger of an alienation, even tho' this reſtriction was not in force. Nay, ſome gentlemen in the Iſland of Zealand have actually offered to make a ſurrender to the king of large tracts of very fertile land in the Iſland of Zealand, if his majeſty would be pleaſed to accept of them in place of the impoſitions laid on them. The reaſon of this is, becauſe, by the law of Denmark, if any eſtate is burdened beyond what it can bear, the owner muſt make up the deficiency out of his other eſtates, if he has any. Hence the king generally refuſes ſuch offers; and ſome gentlemen have been tranſported with joy when they heard that his majeſty had been "graciouſly pleaſed to accept their whole eſtates."

This oppreſſion of the nobles by the king produces in them a like diſpoſition to oppreſs the commons; and the conſequence of all this is, that there is no part of the world where extravagance and diſſipation reigns to ſuch a degree. The courtiers maintain ſplendid equipages, wear fine clothes, drink a vaſt quantity of French wine, and indulge themſelves with eating to exceſs. Such as derive money from their employments, inſtead of purchaſing land in Denmark, remit their caſh to the banks of Hamburgh and Amſterdam. The merchants and burghers tread in the ſteps of their ſuperiors: they ſpend all their gains in luxury and pleaſure, afraid of incurring the ſuſpicion of affluence, and being ſtripped by taxation. The peaſant, or boor, follows the ſame example. No ſooner has he earned a rix-dollar than he makes haſte to expend it in brandy, leſt it ſhould fall into the hands of his oppreſſive landlord. This lower claſs of people are as abſolute ſlaves as the negroes in the Weſt Indies, and ſubſiſt upon much harder fare. The value of eſtates is not computed by the number of acres, but by the ſtock of boors, who, like the timber, are reckoned a parcel of the freehold; and nothing can be more wretched than the ſtate of theſe boors. They feed upon ſtock-fiſh, ſalted meats, and other coarſe diet: there is not the leaſt piece of furniture of any value in their houſes, except feather-beds, of which there is great plenty in Denmark; and which are uſed not only as beds to lie on, but as blankets for covering. After the boor has toiled like a ſlave to raiſe the king's taxes, he muſt pay the overplus of his toil to his needy landlord. Should he improve his ground and repair his farm-houſe, his cruel maſter will immediately tranſplant him to a barren farm and a naked habitation, that he may let the improved ground to another tenant at a higher price. The peaſants likewiſe ſuſtain a great deal of damage and violence from the licentious ſoldiers that are quartered in their houſes. They are moreover obliged to furniſh horſes and waggons for the royal family and all their attendants when the king makes a progreſs through the country, or removes his reſidence from one palace to another. On ſuch occaſions the neighbouring boors are ſummoned to aſſemble with their cattle and carriages, and not only to live at their own expence, but to bear every ſpecies of outrage from the meaneſt lacquies of thoſe who attend his majeſty. The warlike ſpirit of the Danes no longer ſubſiſts: the common people are mean-ſpirited, ſuſpicious, and deceitful; nor have they that talent for mechanics ſo remarkable in ſome northern nations. While the peaſants are employed in their labour without doors, the women are occupied at home in ſpinning yarn for linen, which is here made in great perfection.

21
Dreſs, &c.

In Denmark, all perſons of any rank above the vulgar dreſs in the French taſte, and affect finery; the winter-dreſs of the ladies is peculiar to the country, very neat, warm, and becoming. The common people are likewiſe remarkably neat, and pride themſelves in different changes of linen. They are very little addicted to jollity and diverſion: their whole amuſements conſiſt in running at the gooſe on Shrove Tueſday, and in winter in being drawn in ſleds upon the ice. They alſo feaſt and make merry at weddings and funerals. With reſpect to marriage, the man and woman frequently cohabit together on contract long before the ceremony is performed. The nobility and gentry pique themſelves on ſumptuous burials and monuments for the dead: the corpſe is very often kept in a vault, or in the chancel of a church, for ſeveral years, before an opportunity offers of celebrating the funeral.

The taverns in this country are poorly ſupplied; and he who diets in them muſt be contented to eat in a public room, unleſs he will condeſcend to pay an extravagant price for a private apartment. The metropolis is but indifferently furniſhed with game. The wild-ducks and plover are hardly eatable; but the hares are good, and the markets ſometimes produce tolerable roebuck. Their ſea-fiſh are not to be commended; but the rivers produce plenty of delicious carp, perch, and craw-fiſh. The gardens of the gentry are well provided with melons, grapes, peaches, and all ſorts of greens and ſalads in perfection.

23 Forces by ſea and land. The naval power of Denmark, formerly ſo great, is now become much leſs conſiderable. Of late, however, commerce has conſiderably increaſed; a conſiderable Eaſt India trade has been carried on; they have alſo extended their commerce to the Weſt Indies, where they have ſettled the iſland of St Thomas; to the coaſt of Guinea, where they maintain the fort of Chriſtianburgh; to the Mediterranean; and to Greenland. The navy conſiſts of about 30 ſhips of the line; beſides frigates, bombs, tenders, and yachts. The land-forces, including 5000 reſerves, which form a kind of militia, amount to near 40,000 men, horſe, dragoons, and infantry. Theſe laſt, officers as well as ſoldiers, conſiſt chiefly of ſtrangers, Germans, Poles, Courlanders, Dutch, Swedes, Scots, and Iriſh. The cavalry are generally natives.

24 Revenue. The revenue of his Daniſh majeſty ariſes from taxes laid on his own ſubjects; from the duties paid by foreigners, from his own eſtate, crown-lands, and confiſcations. The taxes are altogether arbitrary, and therefore fluctuating; but they are always grievous to the ſubject. They commonly conſiſt of cuſtoms or toll, for export and import; of exciſe upon the conſumption of wine, ſalt, tobacco, and all kinds of proviſions; of taxes upon marriages, paper, brewing, grinding, and the exerciſe of different profeſſions; of impoſitions on land, poll-money, ground-rent for all houſes in Copenhagen and elſewhere; of money raiſed for maintaining fortifications, and for a portion to the king's daughter when ſhe happens to be married; but this ſeldom exceeds 100,000 rix-dollars. One conſiderable article in the revenue is the toll paid by foreign ſhips that paſs through the Sound, or *Ore-Sound* (the ſtrait between Schonen and Zealand), into the Baltic. This was originally no other than a ſmall contribution, which trading nations agreed to make for maintaining lights at certain places, to direct their courſe through the paſſage in dark and ſtormy weather. At the ſame time theſe trading nations agreed, that every ſhip ſhould paſs this way and pay its ſhare of the expence, rather than uſe the Great Belt, which is the other paſſage, but unprovided with any ſuch conveniency. In proceſs of time the Danes converted this voluntary contribution into an exorbitant toll, and even exacted arbitrary ſums, in proportion to the weakneſs of the nation whoſe ſhips they viſited. Theſe exactions ſometimes involved them in quarrels with their neighbours, and the toll was regulated in repeated treaties.

25 Orders of knighthood. To the court of Copenhagen belong two orders of knighthood; namely, that of the elephant, and that of Danebrugh: the badge of the former, which they deem the moſt honourable, is an elephant ſurmounted with a caſtle, ſet in diamonds, and ſuſpended to a ſky-coloured watered ribbon, worn like the George in England. This order is conferred only on perſons of the higheſt quality, and the moſt extraordinary merit. The order of Danebrugh is beſtowed as an honorary reward upon the nobleſſe of an inferior rank, who have diſtinguiſhed themſelves in the ſervice. Its inſignia conſiſt of a white ribbon with red edges, worn over the left ſhoulder, from which depends a ſmall croſs of diamonds, and an embroidered ſtar on the breaſt of the coat, ſurrounded with the motto *pietate & juſtitia*.

DENNIS, or St Dennis, a famous town of the Iſle of France, with a Benedictine abbey, wherein are the tombs of the kings of France, with a conſiderable treaſure. E. Long. 2. 26. N. Lat. 48. 56.

Dennis (John), the celebrated critic, was the ſon of a reputable tradeſman in London, and born in the year 1657. He received the firſt branches of education at the great ſchool in Harrow on the Hill, where he commenced acquaintance and intimacy with many young noblemen and gentlemen, who afterwards made conſiderable figures in public affairs, whereby he laid the foundation of a very ſtrong and extenſive intereſt, which might, but for his own fault, have been of infinite uſe to him in future life. From Harrow he went to Caius-college Cambridge; where, after his proper ſtanding, he took the degree of bachelor of arts. When he quitted the univerſity, he made the tour of Europe; in the courſe of which he conceived ſuch a deteſtation for deſpotiſm, as confirmed him ſtill more in thoſe Whig principles which he had from his infancy imbibed.

On his return to England he became early acquainted with Dryden, Wycherly, Congreve, and Southerne; whoſe converſation inſpiring him with a paſſion for poetry, and a contempt for every attainment that had not ſomething of the *belles lettres*, diverted him from the acquiſition of any profitable art, or the exerciſe of any profeſſion. This, to a man who had not an independent income, was undoubtedly a misfortune: however, his zeal for the Proteſtant ſucceſſion having recommended him to the patronage of the duke of Marlborough, that nobleman procured him a place in the cuſtoms worth 120l. per annum; which he enjoyed for ſome years, till from profuſeneſs and want of œconomy, he was reduced to the neceſſity of diſpoſing of it to ſatisfy ſome very preſſing demands. By the advice of Lord Halifax, however, he reſerved to himſelf, in the ſale of it, an annuity for a term of years; which term he outlived, and was, in the decline of his life, reduced to extreme neceſſity.

Mr Theo. Cibber relates an anecdote of him, which we cannot avoid repeating, as it is not only highly characteriſtic of the man whoſe affairs we are now conſidering, but alſo a ſtriking and melancholy inſtance, among thouſands, of the diſtreſsful predicaments into which men of genius and literary abilities are perhaps apter than any others to plunge themſelves, by paying too ſlight an attention to the common concerns of life, and their own moſt important intereſts. "After that he was worn out, (ſays that author,) with age and poverty, he reſided within the verge of the court, to prevent danger from his creditors. One Saturday night, he happened to ſaunter to a public houſe, which in a ſhort time he diſcovered to be without the verge. He was ſitting in an open drinking-room, when a man of a ſuſpicious appearance happened to come in. There was ſomething about the man which denoted to Mr Dennis that he was a bailiff. This ſtruck him with a panic; he was afraid his liberty was at an end; he ſat in the utmoſt ſolicitude, but durſt not offer to ſtir leſt he ſhould be ſeized upon. After an hour or two had paſſed in this painful anxiety, at laſt the clock ſtruck twelve; when Mr Dennis, in an ecſtaſy, cried out, addreſſing himſelf to the ſuſpected perſon, "Now, Sir, bailiff or no bailiff, I don't care a farthing for you, you have no power now." The man was aſtoniſhed at his behaviour; and when it was explained to him, was ſo much affronted with the ſuſpicion, that had not Mr Dennis found his protection in age, he would probably have ſmarted for his miſtaken opinion. A ſtrong picture of the effects of fear and apprehenſion, in a temper naturally ſo timorous and jealous as Mr Dennis's; of which the following is a ſtill more whimſical inſtance. In 1704, came out his favourite tragedy, *Liberty Aſſerted;* in which were ſo many ſtrokes on the French nation, that he thought they were never to be forgiven. He had worked himſelf into a perſuaſion that the king of France would inſiſt on his being delivered up, before he would conſent to a peace: and full of this idea of his own importance, when the congreſs was held at Utrecht, he is ſaid to have waited on his patron the duke of Marlborough, to deſire that no ſuch article might be ſtipulated. The duke told him he really had no intereſt then with the miniſtry; but had made no ſuch proviſion for his own ſecurity, though he could not help thinking he had done the French as much injury as Mr Dennis himſelf. Another ſtory relating to this affair is, that being at a gentleman's houſe on the coaſt of Suſſex, and walking one day on the ſea-ſhore, he ſaw a ſhip ſailing, as he fancied, towards him: he inſtantly ſet out for London, in the fancy that he was betrayed; and, congratulating himſelf on his eſcape, gave out that his friend had decoyed him down to his houſe, to ſurrender him up to the French.

Mr Dennis, partly through a natural peeviſhneſs and petulance of temper, and partly perhaps for the ſake of procuring the means of ſubſiſtence, was continually engaged in a paper-war with his cotemporaries, whom he ever treated with the utmoſt ſeverity: and, though many of his obſervations were judicious, yet he uſually conveyed them in language ſo ſcurrilous and abuſive, as deſtroyed their intended effect; and as his attacks were almoſt always on perſons of ſuperior abilities to himſelf, viz. Addiſon, Steele, and Pope; their replies uſually turned the popular opinion ſo greatly againſt him, that, by irritating his teſty temper the more, it rendered him a perpetual torment to himſelf; till at length, after a long life of viciſſitudes, diſappointments and turmoils, rendered wretched by indiſcretion, and hateful by malevolence, having outlived the reverſion of his eſtate, and reduced to diſtreſs, from which his having been daily creating enemies had left him ſcarcely any hopes of relief, he was compelled to what muſt be the moſt irkſome ſituation that can be conceived in human life, the receiving obligations from thoſe whom he had been continually treating ill. In the very cloſe of his days, a play was acted for his benefit at the little theatre in the Hay-market, procured through the united intereſts of Meſſrs Thompſon, Mallet, and Pope; the laſt of whom, notwithſtanding the groſs manner in which Mr Dennis had on many occaſions uſed him, and the long warfare that had ſubſiſted between them, intereſted himſelf very warmly for him; and even wrote an occaſional prologue to the play, which was ſpoken by Mr Cibber. Not long after this, viz. on the 6th of January 1733, he died, being then in the 77th year of his age.

Mr Dennis certainly was poſſeſſed of much erudition, and a conſiderable ſhare of genius. In proſe, he is far from a bad writer, where abuſe or perſonal ſcurrility does not mingle itſelf with his language. In verſe, he is extremely unequal; his numbers being at ſome times ſpirited and harmonious, and his ſubjects elevated and judicious; and at others, flat, harſh, and puerile.—As a dramatic author, he certainly deſerves not to be held in any conſideration. It was juſtly ſaid of him by a wit, that he was the moſt complete inſtructor for a dramatic poet, ſince he could teach him to diſtinguiſh good plays by his *precepts*, and bad ones by his *examples*.

DENOMINATOR, in arithmetic, a term uſed in ſpeaking of fractions. See ARITHMETIC, n° 21.

DENS CANIS, or *Dog's-tooth*, in botany. See ERYTHRONIUM.

DENS *Leonis*. See LEONTODON.

DENSITY *of* BODIES, is that property directly oppoſite to rarity, whereby they contain ſuch a quantity of matter under ſuch a bulk.

Accordingly, a body is ſaid to have double or triple the denſity of another body, when, their bulk being equal, the quantity of matter is in the one double or triple the quantity of matter in the other.

DENSITY *of the Air*, is a property that has employed the later philoſophers, ſince the diſcovery of the Toricellian experiment.

It is demonſtrated, that in the ſame veſſel, or even in veſſels communicating with each other, at the ſame diſtance from the centre, the air has every where the ſame denſity. The denſity of air, *cæteris paribus*, increaſes in proportion to the compreſſing powers. Hence the inferior air is denſer than the ſuperior; the denſity, however, of the lower air is not proportional to the weight of the atmoſphere on account of heat and cold, and other cauſes perhaps which make great alterations in denſity and rarity. However, from the elaſticity of the air, its denſity muſt be always different at different heights from the earth's ſurface; for the lower parts being preſſed by the weight of thoſe above, will be made to accede nearer to each other, and the more ſo as the weight of the incumbent air is greater. Hence, the denſity of the air is greateſt at the earth's ſurface, and decreaſes upwards in geometrical proportion to the altitudes taken in arithmetical progreſſion.

If the air be rendered denſer, the weight of bodies in it is diminiſhed; if rarer, increaſed, becauſe bodies loſe a greater part of their weight in denſer than in rarer mediums. Hence, if the denſity of the air be ſenſibly altered, bodies equally heavy in a rarer air, if their ſpecific gravities be conſiderably different, will loſe their equilibrium in the denſer, and the ſpecifically heavier body will preponderate. See PNEUMATICS.

DENTALIUM, in natural hiſtory, a ſhell-fiſh belonging to the order of vermes teſtacea. The ſhell conſiſts of one tubulous ſtraight valve, open at both ends. There are eight ſpecies, diſtinguiſhed by the angles, ſtriæ, &c. of their ſhells.

DENTARIA, TOOTH-WORT, or *Tooth-violet;* a genus of the ſiliquoſa order, belonging to the tetradynamia claſs of plants. There are three ſpecies, all of them hardy perennials; producing annual ſtalks 12 or 18 inches high, adorned with many-lobed leaves, and ſpikes of quadrupetalous cruciform flowers of a red or purple colour. They delight in ſhady places; and are propagated either by ſeeds, or parting the roots. The ſeeds may be ſown in autumn, or early in the ſpring, in a ſhady border of light earth; and when the plants are three inches high, they may be planted where they are to remain. The time for parting the roots is in October or November, or early in the ſpring.

DENTATED LEAF. See BOTANY, p. 1296.

DENTATUS (Curius), a renowned diſintereſted Roman general; whoſe virtues render him more memorable than even his great military reputation, flouriſhed 272 years B. C. He was thrice conſul; he conquered the Samnites, Sabines, and Lucanians; and gave each citizen 40 acres of land, allowing himſelf no more. The ambaſſadors of the Samnites making him a viſit, found him boiling turnips in a pipkin; upon which, they offered him gold to come over to their intereſt; but he told them, his deſign was not to grow rich, but to command thoſe who were ſo. He defeated Pyrrhus near Tarentum, and received the honour of a triumph.

DENTEX, in ichthyology. See SPARUS.

DENTILES, or DENTILS, in architecture, an ornament in corniches bearing ſome reſemblance to teeth, particularly uſed in the Ionic and Corinthian orders. See ARCHITECTURE.

DENTIFRICE, in medicine, a remedy for the teeth. There are various kinds; generally made of earthy ſubſtances finely pounded, and mixed with alum, or ſome other ſaline ſubſtances: but theſe are pernicious, on account of their wearing away the enamel of the teeth; but more eſpecially by the ſeptic quality with which theſe earthy ſubſtances are endowed. On this account, a portion of Peruvian bark finely pounded is now commonly added, which anſwers the double purpoſe of cleaning the teeth, and preſerving them afterwards from corruption.

DENTILLARIA. See PLUBMAGO.

DENTISCALPRA, in ſurgery, an inſtrument for ſcouring yellow, livid, or black teeth; to which being applied near the gums, it ſcrapes off the foul morbid cruſt.

DENTITION, the breeding or cutting the teeth in children. See (*Index* ſubjoined to) MEDICINE.

DENUNCIATION, a ſolemn publication or promulgation of any thing.

All veſſels of enemies are lawful prizes, after denunciation or proclamation of war. The deſign of the denunciation of excommunicated perſons, is that the ſentence may be the more fully executed by the perſon's being more known.

DENUNCIATION *at the Horn*, in Scots law. See LAW, Part III. N° clxvi. 14.

DENYS (the Little), a Scythian, became abbot of a monaſtery at Rome: he was the firſt who computed time from the birth of Dionyſius to Chriſt, and fixed that great event, according to the vulgar æra. He was alſo a learned canon-law writer, and died about the year 540.

DEOBSTRUENTS, in pharmacy, ſuch medicines as open obſtructions. See DETERGENT.

DEODAND, in our cuſtoms, a thing given or forfeited as it were to God, for the pacification of his wrath in a caſe of miſadventure, whereby a Chriſtian ſoul comes to a violent end, without the fault of any reaſonable creature.

As, if a horſe ſtrike his keeper and kill him: if a man, in driving a cart, falls ſo as the cart-wheel runs over him, and preſſes him to death: if one be felling a tree, and gives warning to the ſtanders-by to look to themſelves, yet a man is killed by the fall thereof: in the firſt place, the horſe; in the ſecond, the cart-wheel, cart, and horſes; and in the third, the tree, is *Deo dandus*, "*to be given to God*," that is, to the king, to be diſtributed to the poor by his almoner, for expiation of this dreadful event; though effected by irrational, nay, ſenſeleſs and dead creatures.

> *Omnia quæ movent ad mortem ſunt Deodanda.*
> What moves to death, or kills him dead,
> Is *Deodand*, and forfeited.

This law ſeems to be an imitation of that in Exodus, chap. xxi. "If an ox gore a man, or a woman, with his horns, ſo as they die; the ox ſhall be ſtoned to death, and his fleſh not be eat; ſo ſhall his owner be innocent."

Fleta ſays, the Deodand is to be ſold, and the price diſtributed to the poor, for the ſoul of the king, his anceſtors, and all faithful people departed this life.

DEPHLEGMATION, is an operation by which the ſuperabundant water of a body is taken from it; and it is principally effected by evaporation or diſtillation. Dephlegmation is alſo called *concentration*, particularly when acids are the ſubject. See CONCENTRATION.

DEPILATORY MEDICINES, thoſe applied in order to take off the hair: ſuch are lime and orpiment known to be, but which ought to be uſed with great caution.

DEPONENT, in Latin grammar, a term applied to verbs which have active ſignifications, but paſſive terminations or conjugations, and want one of their participles paſſive.

DEPONENT, in the law of Scotland, a perſon who makes a depoſition. See DEPOSITION.

DEPOPULATION, the act of diminiſhing the number of people in any country, whether by war or bad politics.

DEPORTATION, a ſort of baniſhment uſed by the Romans, whereby ſome iſland or other place was allotted to a criminal for the place of his abode, with a prohibition not to ſtir out of the ſame on pain of death.

DEPOSIT, among civilians, ſomething that is committed to the cuſtody of a perſon, to be kept without any reward, and to be returned again on demand.

DEPOSITARY, in law, a perſon intruſted as keeper or guardian of a depoſit.

DEPOSITATION, in Scots law. See LAW, N° clxxiii. 8.

DEPOSITION, in law, the teſtimony given in court by a witneſs upon oath.

DEPOSITION alſo ſignifies the ſequeſtring or depriving a man of ſome dignity and office.

DEPRECATION, in rhetoric, a figure whereby the orator invokes the aid and aſſiſtance of ſome one; or prays for ſome great evil or puniſhment to befal him who ſpeaks falſely, either himſelf or his adverſary.

DEPRECATORY, or DEPRECATIVE, in theology, a term applied to the manner of performing ſome ceremonies in the form of prayer.

The form of abſolution is deprecative in the Greek church, being conceived in theſe terms, *May God abſolve you:* whereas it is in the declarative form in the Latin church, and in ſome of the reformed churches, *I abſolve you.*

DEPRESSION *of the* **POLE.** When a perſon ſails or travels towards the equator, he is ſaid to depreſs the pole; becauſe as many degrees as he approaches nearer the equator, ſo many degrees will the pole be nearer the horizon. This phenomenon ariſes from the ſpherical figure of the earth.

DEPRESSOR, or **DEPRIMENS**, in anatomy, a name applied to ſeveral muſcles, becauſe they depreſs the parts they are faſtened to.

DEPRIVATION, in the canon-law, the depoſing a biſhop, parſon, vicar, *&c.* from his office and preferment.

DEPTFORD, a town three miles eaſt of London, on the ſouthern banks of the Thames; chiefly conſiderable for its fine docks for building ſhips, and the king's yard. E. Long. 0. 4. N. Lat. 51. 30.

DEPTH, the meaſure of any thing from the ſurface downwards.

Meaſuring of **DEPTHS** *by the Barometer*, depends on the ſame principles on which heights are meaſured by the ſame inſtrument. The menſuration of depths, being chiefly applied to mines, is ſtill more precarious than the menſuration of heights, on account of the various kinds of vapours with which theſe ſubterranean regions are filled. But for a particular account of theſe difficulties, with the beſt methods of obviating them, ſee the articles BAROMETER and MINES.

DEPTH *of a Squadron*, or *Battalion*, is the number of men in a file; which in a ſquadron is three, and in a battalion generally ſix. See SQUADRON, FILE, *&c.*

We ſay, the battalion was drawn up ſix *deep*; the enemies horſe were drawn up five *deep*.

DEPURATION is the freeing of any fluid from its heterogeneous matter or feculence. It is of three kinds. 1. Decantation; which is performed by letting the liquid to be depurated ſtand for ſome time in a pretty deep veſſel, till the groſs ſediment has fallen to the bottom; after which the clear fluid is poured off. 2. Deſpumation; which is performed by means of the whites of eggs, or other viſcid matter, and is alſo called CLARIFICATION. 3. Filtration. See CHEMISTRY, nº 69.

DEPURATORY FEVER, a name given by Sydenham to a fever which prevailed much in the years 1661, 1662, 1663, and 1664. He called it depuratory, becauſe he ſuppoſed that nature regulated all the ſymptoms in ſuch a manner, as to fit the febrile matter, prepared by proper concoction, for expulſion in a certain time, either by a copious ſweat, or a freer perſpiration.

DEPUTATION, a miſſion of ſelect perſons out of a company or body, to a prince or aſſembly, to treat of matters in their name.

DEPUTY, a perſon ſent upon ſome buſineſs, by ſome community.

DEPUTY is alſo one that exerciſes an office in another's right; and the forfeiture or miſdemeanour of ſuch deputy ſhall cauſe the perſon whom he repreſents to loſe his office.

DEPUTATUS, among the ancients, a name applied to perſons employed in making of armour; and likewiſe to briſk active people, whoſe buſineſs was to take care of the wounded in engagements, and carry them off the field.

DERBEND, a ſtrong town of Aſia, in Perſia, ſaid to have been founded by Alexander the Great. The walls are built with ſtones as hard as marble; and near it are the remains of a wall which reached from the Caſpian to the Black ſea. It is ſeated near the Caſpian ſea, at the foot of Mount Caucaſus. E. Long. 50. 0. N. Lat. 42. 8.

DERBY, the capital of a county of the ſame name in England. It is thought to have received its name from being formerly a park or ſhelter for deer; and what makes this ſuppoſition more probable is, that the arms of the town conſiſt of a buck couchant in a park. It is very ancient, having been a royal borough in the time of Edward the Confeſſor. At preſent it is a neat town, very populous, and ſends two members to parliament. In digging for foundations of houſes, human bones of a monſtrous ſize have ſometimes been found. The trade conſiſts in wool, corn, malt, and ale, of which conſiderable quantities are ſent to London. Here alſo is that curious machine for throwing ſilk, the model of which Sir Thomas Lombe, at the hazard of his life, brought from Italy. Before that time, the Engliſh merchants uſed to purchaſe thrown ſilks of the Italians for ready money. But by the help of this wonderful machine, one hand-mill will twiſt as much ſilk as 50 people could do without it. It works 73,726 yards of ſilk every time the water-wheel goes round, which is thrice in a minute. The houſe in which it is contained, is five or ſix ſtories high, and half a quarter of a mile in length. When Sir Thomas's patent expired in 1732, the parliament was ſo ſenſible of the value and importance of the machine, that they granted him a further recompence of 14,000l. for the hazard and expence he had incurred in introducing and erecting it, upon condition he ſhould allow an exact model of it to be taken. This model is depoſited in the Tower of London, in order to prevent ſo curious and important an art from being loſt.—The town of Derby is watered by a river and a brook; the latter of which has nine bridges over it, the former only one. W. Long. 1. 45. N. Lat. 52. 57.

DERBY-SHIRE, a county of England, bounded on the eaſt by Nottingham-ſhire, and a part of Leiceſter-ſhire, which laſt bounds it alſo on the ſouth. On the weſt it is bounded by Stafford-ſhire, and part of Cheſhire; and on the north by Yorkſhire. It is near 40 miles in length from ſouth to north; about 30 in breadth on the north ſide, but on the ſouth no more than ſix.—The air is pleaſant and healthful, eſpecially on the eaſt ſide; but on the weſt, about the peak, it is ſharper and more ſubject to wind and rain. The ſoil is very different in different parts of the country. In the eaſt and ſouth parts it is very fruitful in all kinds of grain; but, in the weſt, beyond the Derwent, it is barren and mountainous, producing nothing but a little oats. There is, however, plenty of graſs in the valleys, which affords paſture to a great number of ſheep. This part of the county is called the *Peak*, from a Saxon word ſignifying an eminence. Its mountains are very bleak, high, and barren; but extremely profitable to the inhabitants. They yield great quantities of the beſt lead, antimony, iron, ſcythe-ſtones, grind-ſtones, marble, alabaſter, a coarſe ſort of cryſtal, azure, ſpar, and pit-coal. In theſe mountains are two remarkable caverns, named *Poole's Hole*, and *Elden-Hole*; for a deſcription of which, ſee theſe articles.

DEREHAM, a town of Norfolk in England, ſituated in E. Long. 1. 0. N. Lat. 52. 40. It is pretty large, and the market is noted for woollen yarn.

DERHAM (Doctor William), a very celebrated Engliſh philoſopher and divine, born in 1657. In 1682, he was preſented to the vicarage of Wargrave in Berkſhire; and, in 1689, to the valuable rectory of Upminſter in Eſſex; which latter lying at a convenient diſtance from London, afforded him an opportunity of converſing and correſponding with the greateſt virtuoſos of the nation. Applying himſelf there with great eagerneſs to natural and experimental philoſophy, he ſoon became a diſtinguiſhed member of the Royal Society, whoſe Philoſophical Tranſactions contain a great variety of curious and valuable pieces, the fruits of his laudable induſtry. In his younger years he publiſhed his *Artificial Clockmaker*, which has been often printed: and in 1711, 1712, and 1714, he preached thoſe ſermons at Boyle's lecture which he afterward digeſted under the well-known titles of *Phyſico-Theology* and *Aſtro-Theology*, and enriched with valuable notes and copper-plates. The laſt thing he publiſhed of his own compoſition was *Chriſto-Theology*, a demonſtration of the divine authority of the Chriſtian religion, being the ſubſtance of a ſermon preached at Bath in 1729. This great good man, after ſpending his life in the moſt agreeable as well as improving ſtudy of nature, died at Upminſter in 1735; and, beſide many other works, left a valuable collection of curioſities, particularly ſpecimens of birds and inſects of this iſland.—It may be neceſſary juſt to obſerve, that Doctor Derham was very well ſkilled in medical, as well as in phyſical, knowledge; and was conſtantly a phyſician to the bodies as well as the ſouls of his pariſhioners.

DERIVATION, in medicine, is when a humour which cannot conveniently be evacuated at the part affected, is attracted from thence, and diſcharged elſewhere; thus, a bliſter is applied to the neck to draw away the humour from the eyes.

The doctrine of derivation and revulſion ſo much talked of by the ancients is, in their ſenſe of theſe terms, wholly exploded. By revulſion, they meant the driving back of the fluids from one part to another. The only rational meaning the word *revulſion*, as here applied, can have, is, the preventing too great an afflux of humours to any part, either by contracting the area of the veſſels, or diminiſhing the quantity of what flows from them; the firſt of theſe intentions is anſwered by the application of repellents to the part; the laſt by bleeding, and other evacuations: thus, any medicines promoting the ſecretions, may be ſaid to make a revulſion; and in this ſenſe derivation can only be underſtood.

DERIVATION, in grammar, the affinity one word has with another, by having been originally formed from it. See DERIVATIVE.

DERIVATIVE, in grammar, a word which is derived from another called its PRIMITIVE. Thus, *manhood* is derived from *man*, *deity* from *Deus*, and *lawyer* from *law*.

DERMESTES, in zoology, a genus of inſects belonging to the order of coleoptera. The antennæ are clavated, with three of the joints thicker than the reſt; the breaſt is convex; and the head is inflected below the breaſt. There are thirty ſpecies, diſtinguiſhed by their colour, *&c.*

DERNIER RESSORT. See RESSORT.

DEROGATION, an act contrary to a preceding one, and which annuls, deſtroys, and revokes it, either in whole or in part.

DEROGATORY, a clauſe importing derogation. A derogatory clauſe in a teſtament, is a certain ſentence, cipher, or ſecret character, which the teſtator inſerts in his will, and of which he reſerves the knowledge to himſelf alone, adding a condition, that no will he may make hereafter is to be reckoned valid, if this derogatory clauſe is not inſerted expreſsly and word for word. It is a precaution invented by lawyers againſt latter-wills extorted by violence, or obtained by ſuggeſtion.

DERP, a town of Livonia, and capital of a palatinate of the ſame name, with a biſhop's ſee, and an univerſity. It is ſubject to the Ruſſians, and lies near the river Ambeck. E. Long. 31. 55. N. Lat. 30. 40.

DERVIS, a name given to all Mahommedan monks, though of various orders. The moſt noted among them are the Bektaſhi, the Mevelevi, the Kadri, and the Seyah. The Bektaſhi, who are allowed to marry and live in cities and towns, are obliged, by the rules of their order, to viſit remote lands, and to ſalute every one they meet with *gazel* or love-ſongs, and with *eſma* or the invocation of the names of God, and humbly to wiſh him proſperity, which they do by repeating the word *eivallah*, a ſolemn exclamation of the wreſtlers, by which the conquered yields the palm to the conqueror. The Mevelevi, ſo called from Mevelava their founder, are uſed to turn round for two or three hours together, with ſuch ſwiftneſs, that you cannot ſee their faces. They are great lovers of muſic: in their monaſteries they profeſs great humility and poverty; and when viſited, make no diſtinction of perſons: they firſt bring their gueſts coffee to drink; and if the ways have been dirty, they waſh their feet and ſandals. The Kadri, with a peculiar ſuperſtition, emaciate their bodies; they go quite naked, except their thighs, and often join hands and dance, ſometimes a whole day, repeating with great vehemence, *hu! hu! hu!* (one of the names of God), till, like madmen, they fall on the ground, foaming at the mouth, and running down with ſweat. The prime vizir Kupruli Achmed Paſha, thinking this ſect unbecoming the Mahommedan religion, ordered it to be ſuppreſſed; but, after his death, it revived, and is at preſent more numerous than ever, eſpecially at Conſtantinople. The Seyah are wanderers; and though they have monaſteries, yet they often ſpend their whole life in travelling. When they are ſent out, their ſuperiors impoſe upon them ſuch a quantity of money or proviſions, forbidding them to come back till they have procured it and ſent it to the monaſtery; wherefore, when a Seyah comes into a town, he cries aloud in the market-place, *Ya allah ſenden*, &c. *O God! give me, I pray, five thouſand crowns*, or *a thouſand meaſures of rice*. Many of theſe derviſes travel over the whole Mahommedan world, entertaining the people, wherever they come, with agreeable relations of all the curioſities they have met with. There are derviſes in Egypt, who live with their families, and exerciſe their trades; of which kind are the dancing derviſes at Damaſcus. They are all diſtinguiſhed among themſelves by the different forms and colours of their habits; thoſe of Perſia wear blue; the ſolitaries and wanderers wear only rags of different colours; others carry on their heads a plume made of the feathers of a cock; and thoſe of Egypt wear an octagonal badge of a greeniſh white alabaſter at their girdles, and a high ſtiff cap without any thing round it.

DESAGULIERS (John Theophilus), who introduced the practice of reading public lectures in experimental philoſophy in the metropolis, and who made ſeveral improvements in mechanics; was the ſon of the reverend John Deſaguliers, a French proteſtant refugee, and was born at Rochelle in 1683. His father brought him to England an infant; and at a proper age placed him at Chriſt-church college, Oxford: where he ſucceeded Doctor Keil in reading lectures on experimental philoſophy at Hart Hall. The magnificent duke of Chandos made Doctor Deſaguliers his chaplain, and preſented him to the living of Edgware, near his ſeat at Cannons; and he was afterward chaplain to Frederic prince of Wales. He read lectures with great ſucceſs to the time of his death in 1749. He communicated many curious papers printed in the Philoſophical Tranſactions; publiſhed a valuable *Courſe of Experimental Philoſophy*, in 2 vols 4to.; and gave an edition of *Gregory's Elements of Catoptrics and Dioptrics*, with an Appendix on reflecting teleſcopes, 8vo. He was a member of the Royal Society, and of ſeveral foreign academies.

DESART, a large extent of country entirely barren, and producing nothing. In this ſenſe ſome are ſandy deſarts; as thoſe of Lop, Xamo, Arabia, and ſeveral others in Aſia; in Africa, thoſe of Libya and Zara: others are ſtony, as the deſart of Pharan in Arabia Petrea.

The DESART, abſolutely ſo called, is that part of Arabia, ſouth of the Holy Land, where the children of Iſrael wandered forty years.

DESCANT, in muſic, the art of compoſing in ſeveral parts. See COMPOSITION.

Deſcant is three-fold, viz. plain, figurative, and double.

Plain DESCANT is the ground-work and foundation of all muſical compoſitions, conſiſting altogether in the orderly placing of many concords, anſwering to ſimple counterpoint. See COUNTERPOINT.

Figurative or Florid DESCANT, is that part of an air of muſic wherein ſome diſcords are concerned, as well, though not ſo much, as concords. This may be termed the ornamental and rhetorical part of muſic, in regard that there are introduced all the varieties of points, ſyncopes, diverſities of meaſures, and whatever is capable of adorning the compoſition.

DESCANT *Double*, is when the parts are ſo contrived, that the treble, or any high part, may be made the baſs; and, on the contrary, the baſs the treble.

DESCARTES. See CARTES.

DESCENDANT. The iſſue of a common parent, *in infinitum*, are called his deſcendants. See article DESCENT.

DESCENSION, in aſtronomy, is either right or oblique.

Right DESCENSION, is an arch of the equinoctial, intercepted between the next equinoctial point and the interſection of the meridian, paſſing through the centre of the object, at its ſetting, in a right ſphere.

Oblique DESCENSION, an arch of the equinoctial, intercepted between the next equinoctial point and the horizon, paſſing through the centre of the object, at its ſetting, in an oblique ſphere.

DESCENT, in general, is the tendency of a body from a higher to a lower place; thus all bodies, unleſs otherwiſe determined by a force ſuperior to their gravity, deſcend towards the centre of the earth. See GRAVITY and MECHANICS.

DESCENT, or *Hereditary Succeſſion*, in law, is the title whereby a man, on the death of his anceſtor, acquires his eſtate by right of repreſentation, as his heir at law. An heir therefore is he upon whom the law caſts the eſtate, immediately on the death of the anceſtor: and an eſtate ſo deſcending to the heir, is in law called the *inheritance*.

Deſcent is either *lineal* or *collateral*. The former is that conveyed down in a right line from the grandfather to the father, and from the father to the ſon, and from the ſon to the grandſon. The latter is that ſpringing out of the ſide of the line or blood; as from a man to his brother, nephew, or the like.

The doctrine of deſcents, or law of inheritances in fee-ſimple, is a point of the higheſt importance. (See the article FEE.) All the rules relating to purchaſes, whereby the legal courſe of deſcents is broken and altered, perpetually refer to this ſettled law of inheritance, as a *datum* or firſt principle univerſally known, and upon which their ſubſequent limitations are to work. Thus a gift in tail, or to a man and the heirs of his body, is a limitation that cannot be perfectly underſtood, without a previous knowledge of the law of deſcents in fee-ſimple. One may well perceive, that this is an eſtate confined in its deſcent to ſuch heirs only of the donee, as have ſprung or ſhall ſpring from his body: but who thoſe heirs are, whether all his children both male and female, or the male only, and (among the males) whether the eldeſt, youngeſt, or other ſon alone, or all the ſons together, ſhall be his heir; this is a point, that we muſt reſult back to the ſtanding law of deſcents in fee-ſimple to be informed of.

And, as this depends not a little on the nature of kindred, and the ſeveral degrees of conſanguinity, it will be neceſſary to refer the reader to the article CONSANGUINITY, where the true notion of this kindred or alliance in blood is particularly ſtated.

We ſhall here exhibit a ſeries of rules or canons of inheritance, with illuſtrations, according to which, by the law of England, eſtates are tranſmitted from the anceſtor to the heir.

1. "Inheritances ſhall lineally deſcend to the iſſue
" of the perſon laſt actually ſeiſed, *in infinitum*; but
" ſhall never lineally aſcend."

To underſtand both this and the ſubſequent rules, it muſt be obſerved, that by law no inheritance can veſt, nor can any perſon be the actual complete heir of another, till the anceſtor is previouſly dead. *Nemo eſt hæres viventis*. Before that time, the perſon who is next in the line of ſucceſſion is called an *heir apparent*, or *heir preſumptive.* Heirs apparent are ſuch, whoſe right of inheritance is indefeaſible, provided they outlive the anceſtor; as the eldeſt ſon or his iſſue, who muſt, by the courſe of the common law, be heirs to the father whenever he happens to die. Heirs preſumptive are ſuch, who, if the anceſtor ſhould die immediately, would in the preſent circumſtances of things be his heirs; but whoſe right of inheritance may be defeated by the contingency of ſome nearer heir being born: as a brother or nephew, whoſe preſumptive ſucceſſion may be deſtroyed by the birth of a child: or a daughter, whoſe preſent hopes may be hereafter cut off by the birth of a ſon. Nay, even if the eſtate hath deſcended, by the death of the owner, to ſuch a brother, or nephew, or daughter; in the former caſes, the eſtate ſhall be deveſted and taken away by the birth of a poſthumous child; and, in the latter, it ſhall alſo be totally deveſted by the birth of a poſthumous ſon.

We muſt alſo remember, that no perſon can be properly ſuch an anceſtor, as that an inheritance in lands or tenements can be derived from him, unleſs he hath had actual ſeiſin of ſuch lands, either by his own entry, or by the poſſeſſion of his own or his anceſtor's leſſee for years, or by receiving rent from a leſſee of the freehold: or unleſs he hath what is equivalent to corporal ſeiſin in hereditaments that are incorporeal; ſuch as the receipt of rent, a preſentation to the church in caſe of an advowſon, and the like. But he ſhall not be accounted an anceſtor, who hath had only a bare right or title to enter or be otherwiſe ſeiſed. And therefore all the caſes, which will be mentioned in the preſent article, are upon the ſuppoſition that the deceaſed (whoſe inheritance is now claimed) was the laſt perſon actually ſeiſed thereof. For the law requires this notoriety of poſſeſſion, as evidence that the anceſtor had that property in himſelf, which is now to be tranſmitted to his heir. Which notoriety hath ſucceeded in the place of the ancient feodal inveſtiture, whereby, while feuds were precarious, the vaſſal on the deſcent of lands was formerly admitted in the lord's court (as is ſtill the practice in Scotland); and therefore received his ſeiſin, in the nature of a renewal of his anceſtors grant, in the preſence of the feodal peers: till at length, when the right of ſucceſſion became indefeaſible, an entry on any part of the lands within the county (which if diſputed was afterwards to be tried by thoſe peers) or other notorious poſſeſſion, was admitted as equivalent to the formal grant of ſeiſin, and made the tenant capable of tranſmitting his eſtate by deſcent The ſeiſin therefore of any perſon, thus underſtood, makes him the root or ſtock from which all future inheritance by right of blood muſt be derived: which is very briefly expreſſed in this maxim, *ſeiſina facit ſtipitem.*

Blackſt. Comment.

When therefore a perſon dies ſo ſeiſed, the inheritance firſt goes to his iſſue: as if there be Geoffrey, John, and Mathew, grandfather, father, and ſon; and John purchaſes land, and dies; his ſon Matthew ſhall ſucceed him as heir, and not the grandfather Geoffrey; to whom the land ſhall never aſcend, but ſhall rather eſcheat to the lord.

2. "The male iſſue ſhall be admitted before the female."—Thus ſons ſhall be admitted before daughters; or, as our male lawgivers have ſomewhat uncomplaiſantly expreſſed it, the worthieſt of blood ſhall be preferred. As if John Stiles hath two ſons, Matthew and Gilbert, and two daughters, Margaret and Charlotte, and dies; firſt Matthew, and (in caſe of his death without iſſue) then Gilbert, ſhall be admitted to the ſucceſſion in preference to both the daughters.

3. "Where there are two or more males in equal degree, the eldeſt only ſhall inherit; but the females all together."—As if a man hath two ſons, Matthew and Gilbert, and two daughters, Margaret and Charlotte, and dies; Matthew his eldeſt ſon ſhall alone ſucceed to his eſtate, in excluſion of Gilbert the ſecond ſon and both the daughters; but, if both the ſons die without iſſue before the father, the daughters Margaret and Charlotte ſhall both inherit the eſtate as coparceners.

4. "The lineal deſcendants, *in infinitum*, of any perſon deceaſed, ſhall repreſent their anceſtor; that is, ſhall ſtand in the ſame place as the perſon himſelf would have done, had he been living."—Thus the child, grandchild, or great-grandchild (either male or female) of the eldeſt ſon, ſucceeds before the younger ſon, and ſo *in infinitum.* And theſe repreſentatives ſhall take neither more nor leſs, but juſt ſo much as their principals would have done. As if there be two ſiſters, Margaret and Charlotte; and Margaret dies, leaving ſix daughters; and then John Stiles the father of the two ſiſters dies, without other iſſue: theſe ſix daughters ſhall take among them exactly the ſame as their mother Margaret would have done, had ſhe been living; that is, a moiety of the lands of John Stiles in coparcenary: ſo that, upon partition made, if the land be divided into twelve parts, thereof Charlotte the ſurviving ſiſter ſhall have ſix, and her ſix nieces, the daughters of Margaret, one a-piece.

5. "On failure of lineal deſcendants, or iſſue, of the perſon laſt ſeiſed, the inheritance ſhall deſcend to the blood of the firſt purchaſer; ſubject to the three preceding rules."—Thus, if Geoffrey Stiles purchaſes land, and it deſcends to John Stiles his ſon, and John dies ſeiſed thereof without iſſue; whoever ſucceeds to this inheritance muſt be of the blood of Geoffrey the firſt purchaſer of this family. The firſt purchaſer, *perquiſitor*, is he who firſt acquired the eſtate to his family, whether the ſame was transferred to him by ſale, or by gift, or by any other method, except only that of deſcent.

6. "The collateral heir of the perſon laſt ſeiſed, muſt be his next collateral kinſman, of the whole blood."

Firſt, he muſt be his next collateral kinſman, either perſonally or *jure repreſentationis;* which proximity is reckoned according to the canonical degrees of conſanguinity: See CONSANGUINITY. Therefore, the brother being in the firſt degree, he and his deſcendants ſhall exclude the uncle and his iſſue, who is only in the ſecond.—Thus if John Stiles dies without iſſue, his eſtate ſhall deſcend to Francis his brother, who is lineally deſcended from Geoffrey Stiles his next immediate anceſtor, or father. On failure of brethren, or ſiſters, and their iſſue, it ſhall deſcend to the uncle of John Stiles, the lineal deſcendant of his grandfather George, and ſo on *in infinitum.*

But, ſecondly, the heir need not be the neareſt kinſman abſolutely, but only *ſub modo;* that is, he muſt be the neareſt kinſman of the *whole* blood: for if there be a much nearer kinſman of the *half* blood, a diſtant kinſman of the whole blood ſhall be admitted, and the other entirely excluded.—A kinſman of the whole blood is he that is derived, not only from the ſame anceſtor, but from the ſame couple of anceſtors. For, as every man's own blood is compounded of the bloods of his reſpective anceſtors, he only is properly of the whole or entire blood with another, who hath (ſo far as the diſtance of degrees will permit) all the ſame ingredients in the compoſition of his blood that the other hath. Thus, the blood of John Stiles being compoſed of thoſe of Geoffrey Stiles his father and Lucy Baker his mother, therefore his brother Francis, being deſcended from both the ſame parents, hath entirely the ſame blood with John Stiles; or he is his brother of the whole blood. But if, after the death of Geoffrey, Lucy Baker the mother marries a ſecond huſband, Lewis Gay, and hath iſſue by him; the blood of this iſſue, being compounded of the blood of Lucy Baker (it is true) on the one part, but that of Lewis Gay (inſtead of Geoffrey Stiles) on the other part, it hath therefore only half the ſame ingredients with that of John Stiles; ſo that he is only his brother of the half blood, and for that reaſon they ſhall never inherit to each other. So alſo, if the father has two ſons, A and B, by different venters or wives; now theſe two brethren are not brethren of the whole blood, and therefore ſhall never inherit to each other, but the eſtate ſhall rather eſcheat to the lord. Nay, even if the father dies, and his lands deſcend to his eldeſt ſon A, who enters thereon, and dies ſeiſed without iſſue; ſtill B ſhall not be heir to this eſtate, becauſe he is only of the half blood to A, the perſon laſt ſeiſed: but, had A died without entry, then B might have inherited; not as heir to A his half-brother, but as heir to their common father, who was the perſon laſt actually ſeiſed.

The rule then, together with its illuſtration, amounts to this, That, in order to keep the eſtate of John Stiles as nearly as poſſible in the line of his purchaſing anceſtor, it muſt deſcend to the iſſue of the neareſt couple of anceſtors that have left deſcendants behind them; becauſe the deſcendants of one anceſtor only are not ſo likely to be in the line of that purchaſing anceſtor, as thoſe who are deſcended from two.

But here a difficulty ariſes. In the ſecond, third, fourth, and every ſuperior degree, every man has many couples of anceſtors, increaſing according to the diſtances in a geometrical progreſſion upwards, the deſcendants of all which reſpective couples are (repreſentatively) related to him in the ſame degree. Thus, in the ſecond degree, the iſſue of George and Cecilia Stiles and of Andrew and Eſther Baker, the two grandſires and grandmothers of John Stiles, are each in the ſame degree of propinquity; in the third degree, the reſpective iſſues of Walter and Chriſtian Stiles, of Luke and Francis Kempe, of Herbert and Hannah Baker, and of James and Emma Thorpe, are (upon the extinction of the two inferior degrees) all equally entitled to call themſelves the next kindred of the whole blood to John Stiles. To which therefore of theſe anceſtors muſt we firſt reſort, in order to find out deſcendants to be preferably called to the inheritance? In anſwer to this, and to avoid the confuſion and uncertainty that might ariſe between the ſeveral ſtocks wherein the purchaſing anceſtor may be ſought for,——

7. The ſeventh and laſt rule or canon is, "that "in collateral inheritances the male ſtocks ſhall be "preferred to the female; (that is, kindred derived "from the blood of the male anceſtors ſhall be admit"ted before thoſe from the blood of the female)—un"leſs where the lands have, in fact, deſcended from a "female."—Thus the relations on the father's ſide are admitted *in infinitum*, before thoſe on the mother's ſide are admitted at all; and the relations of the father's father, before thoſe of the father's mother; and ſo on.

For the original and progreſs of the above canons, the reaſons upon which they are founded, and their agreement with the laws of other nations, the curious reader may conſult *Blackſtone's Commentaries*, Vol. II. p. 208—237.

We ſhall conclude with exemplifying the rules themſelves by a ſhort ſketch of the manner in which we muſt ſearch for the heir of a perſon, as John Stiles, who dies ſeiſed of land which he acquired, and which therefore he held as a feud of indefinite antiquity. See the *Table of* Descents, on Plate LXXXVIII.

In the firſt place ſucceeds the eldeſt ſon, Matthew Stiles, or his iſſue, (n° 1.):—if his line be extinct, then Gilbert Stiles and the other ſons, reſpectively, in order of birth, or their iſſue, (n° 2.):—in default of theſe, all the daughters together, Margaret and Charlotte Stiles, or their iſſue, (n° 3.)—On failure of the deſcendants of John Stiles himſelf, the iſſue of Geoffrey and Lucy Stiles, his parents, is called in: *viz.* firſt, Francis Stiles, the eldeſt brother of the whole blood, or his iſſue, (n° 4.):—then Oliver Stiles, and the other whole brothers, reſpectively, in order of birth, or their iſſue, (n° 5.):—then the ſiſters of the whole blood all together, Bridget and Alice Stiles, or their iſſue, (n° 6.)—In defect of theſe, the iſſue of George and Cecilia Stiles, his father's parents; reſpect being ſtill had to their age and ſex; (n° 7.):—then the iſſue of Walter and Chriſtian Stiles, the parents of his paternal grandfather, (n° 8.):—then the iſſue of Richard and Anne Stiles, the parents of his paternal grandfather's father, (n° 9.):—and ſo on in the paternal grandfather's paternal line, or blood of Walter Stiles, *in infinitum*. In defect of theſe, the iſſue of William and Jane Smith, the parents of his paternal grandfather's mother, (n° 10.):—and ſo on in the paternal grandfather's maternal line, or blood of Chriſtian Smith, *in infinitum*; till both the immediate bloods of George Stiles, the paternal grandfather, are ſpent.—Then we muſt reſort to the iſſue of Luke and Frances Kempe, the parents of John Stiles's paternal grandmother, (n° 11.):—then to the iſſue of Thomas and Sarah Kempe, the parents of his paternal grandmother's father, (n° 12.);—and ſo on in the paternal grandmother's paternal line, or blood of Luke Kempe, *in infinitum*.—In default of which, we muſt call in the iſſue of Charles and Mary Holland, the parents of his paternal grandmother's mother, (n° 13.):—and ſo on in the paternal grandmother's maternal line, or blood of Frances Holland, *in infinitum*; till both the immediate bloods of Cecilia Kempe, the paternal grandmother, are alſo ſpent.—Whereby the paternal blood of John Stiles entirely failing, recourſe muſt then, and not before, be had to his maternal relations; or the blood of the Bakers (n° 14, 15, 16.), Willis's (n° 17.), Thorpes (n° 18, 19.), and Whites (n° 20.); in the ſame regular ſucceſſive order as in the paternal line.

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DESIGN, in a general ſenſe, the plan, order, repreſentation, or conſtruction of a building, book, painting, &c. See Architecture, Painting, Poetry, Oratory, and History.

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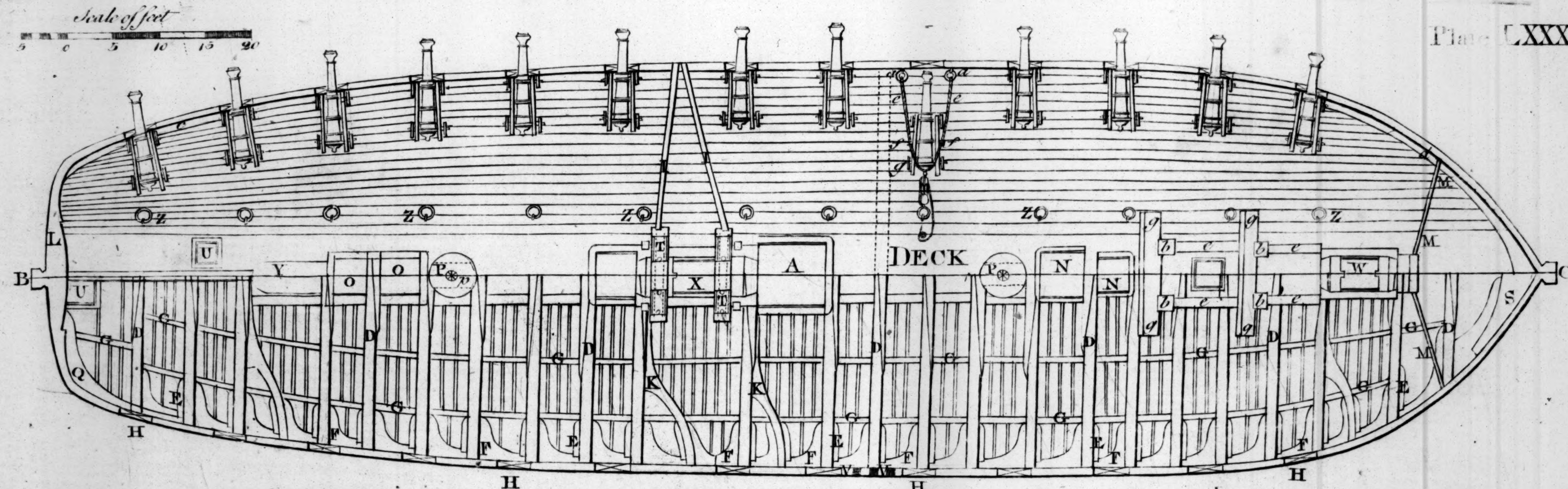
Plate LXXXVIII.



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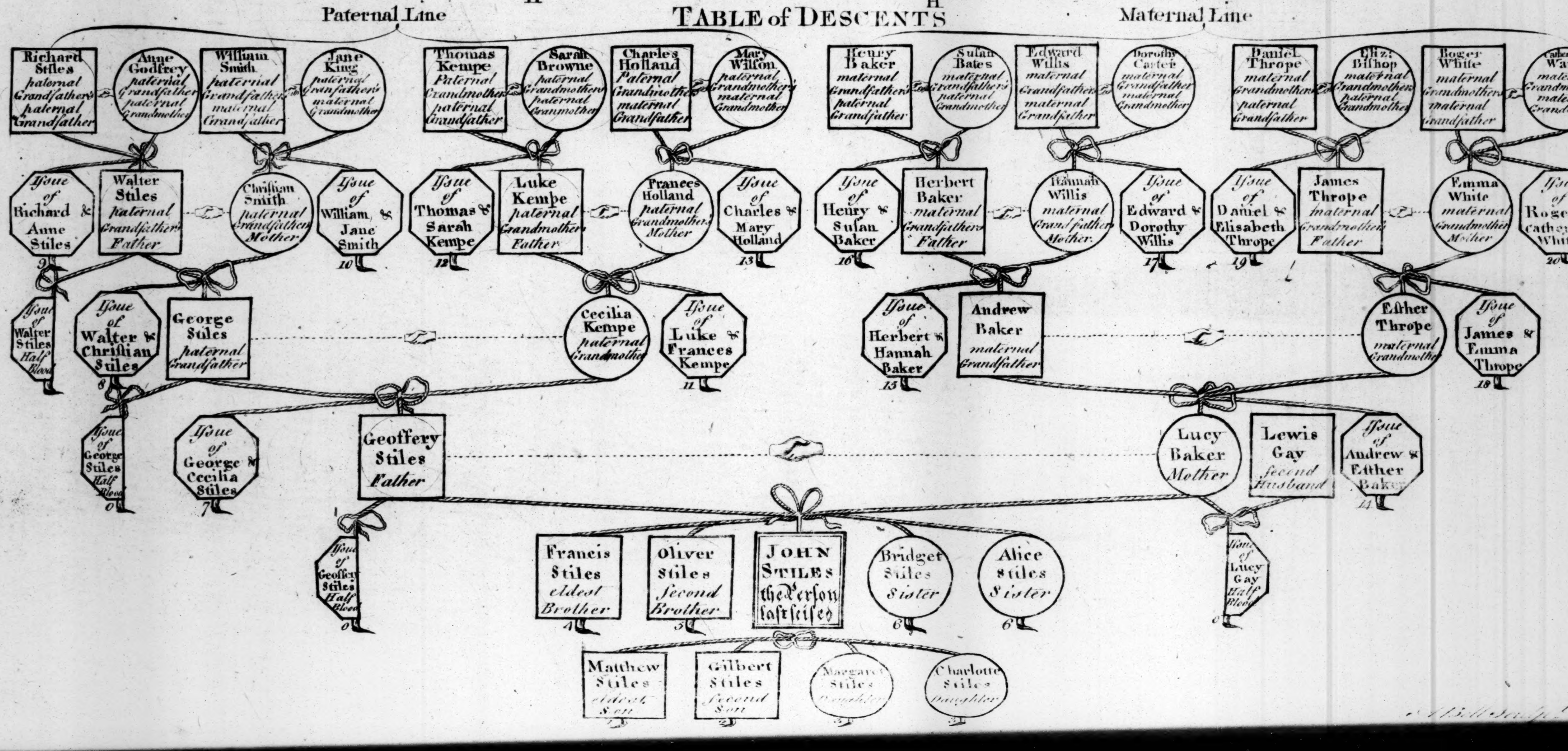

Paternal Line
Maternal Line
Richard Stiles paternal Grandfather's paternal Grandfather
Anne Godfrey paternal Grandfather paternal Grandmother
William Smith paternal Grandfather's maternal Grandfather
Jane King paternal Granfather's maternal Grandmother
Thomas Kempe Paternal Grandmother's paternal Grandfather
Sarah Browne paternal Grandmother's paternal Granmother
Charles Holland Paternal Grandmother's maternal Grandfather
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Henry Baker maternal Grandfather's paternal Grandfather
Suſan Bates maternal Grandfather's paternal Grandmother
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Daniel Thrope maternal Grandmother's paternal Grandfather
Eliz: Biſhop maternal Grandmother's paternal Grandmother
Roger White maternal Grandmother's maternal Grandfather
Catherine Ward maternal Grandmother's maternal Grandmoth
Iſsue of Richard & Anne Stiles 9
Walter Stiles paternal Grandfather's Father
Chriſtian Smith paternal Grandfather's Mother
Iſsue of William, & Jane Smith 10
Iſsue of Thomas & Sarah Kempe 12
Luke Kempe paternal Grandmother's Father
Frances Holland paternal Grandmother's Mother
Iſsue of Charles & Mary Holland 13
Iſsue of Henry & Suſan Baker 16
Herbert Baker maternal Grandfather's Father
Hannah Willis maternal Grandfather's Mother.
Iſsue of Edward & Dorothy Willis 17
Iſsue of Daniel & Eliſabeth Thrope 19
James Thrope maternal Grandmother's Father
Emma White maternal Grandmother's Mother
Iſsue of Roger & Catherine White 20
Iſsue of Walter Stiles Half Blood
Iſsue of Walter & Chriſtian Stiles 8
George Stiles paternal Grandfather
Cecilia Kempe paternal Grandmother
Iſsue of Luke & Frances Kempe 11
Iſsue of Herbert & Hannah Baker 15
Andrew Baker maternal Grandfather
Eſther Thrope maternal Grandmother
Iſsue of James & Emma Thrope 18
Iſsue of George Stiles Half Blood 0
Iſsue of George & Cecilia Stiles 7
Geoffery Stiles Father
Lucy Baker Mother
Lewis Gay ſecond Husband
Iſsue of Andrew & Eſther Baker 14
Iſsue of Geoffery Stiles Half Blood 0
Francis Stiles eldest Brother 4
Oliver Stiles ſecond Brother 5
JOHN STILES the Perſon laſt ſeiſed
Bridget Stiles Siſter 6
Alice Stiles Siſter 6
Iſsue of Lucy Gay Half Blood 0
Matthew Stiles eldest Son 1
Gilbert Stiles ſecond Son 2
Margaret Stiles Daughter 3
Charlotte Stiles Daughter 3

A Bell Sculp.

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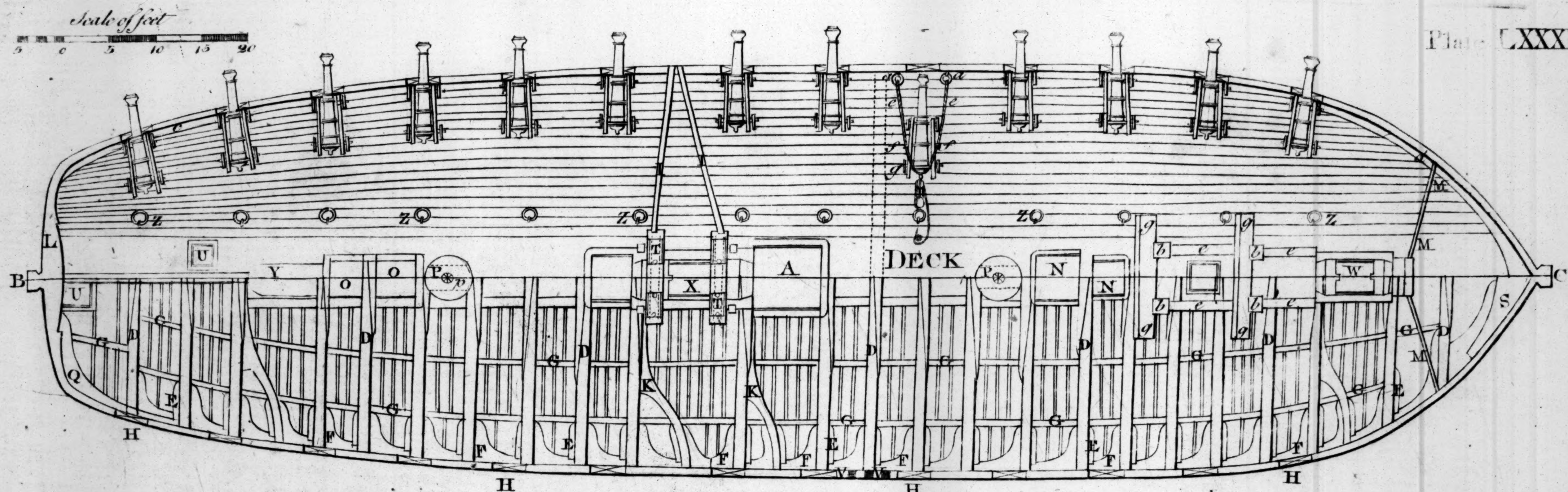
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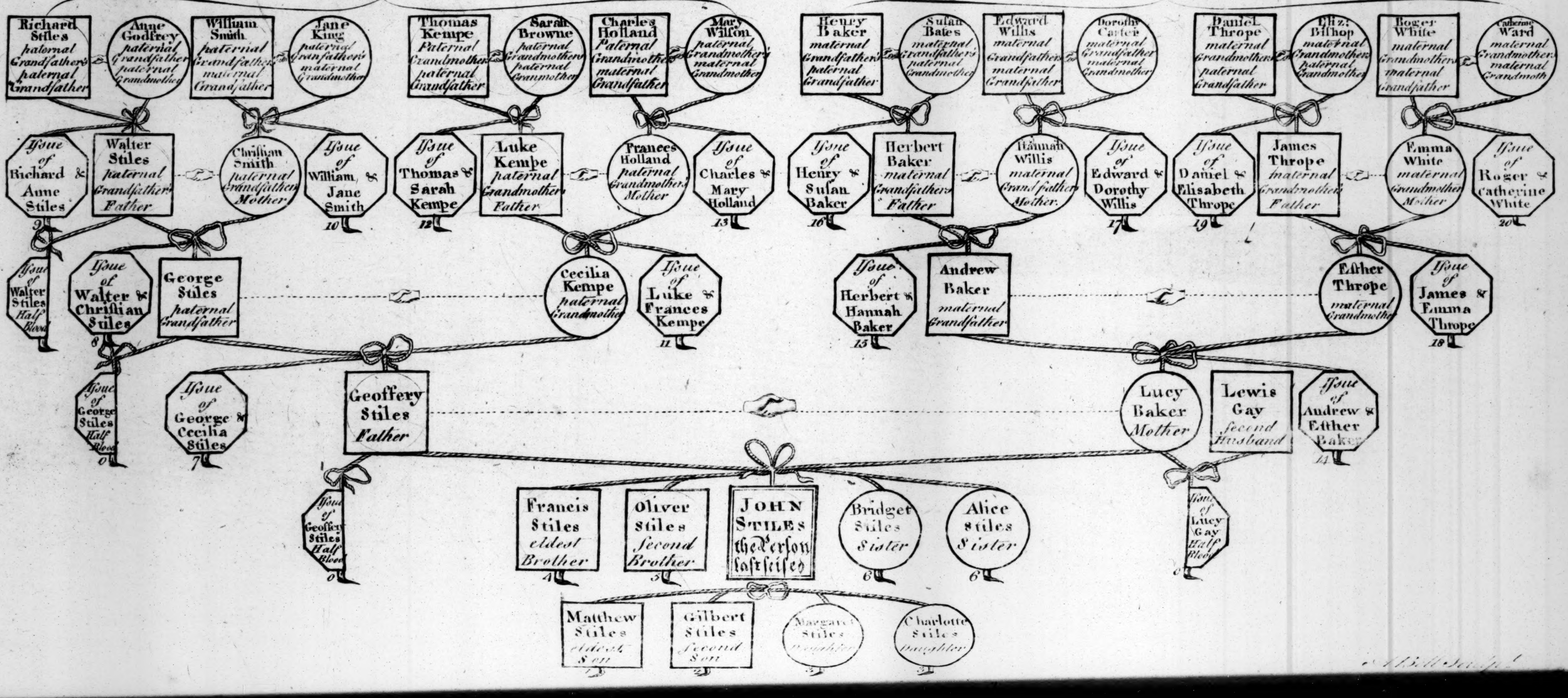
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Catherine Ward maternal Grandmother's maternal Grandmoth
Iſsue of Richard & Anne Stiles 9
Walter Stiles paternal Grandfather's Father
Chriſtian Smith paternal Grandfather's Mother
Iſsue of William & Jane Smith 10
Iſsue of Thomas & Sarah Kempe 12
Luke Kempe paternal Grandmother's Father
Frances Holland paternal Grandmother's Mother
Iſsue of Charles & Mary Holland 13
Iſsue of Henry & Suſan Baker 16
Herbert Baker maternal Grandfather's Father
Hannah Willis maternal Grand father's Mother.
Iſsue of Edward & Dorothy Willis 17
Iſsue of Daniel & Eliſabeth Thrope 19
James Thrope maternal Grandmother's Father
Emma White maternal Grandmother's Mother
Iſsue of Roger & Catherine White 20
Iſsue of Walter Stiles Half Blood
Iſsue of Walter & Chriſtian Stiles 8
George Stiles paternal Grandfather
Cecilia Kempe paternal Grandmother
Iſsue of Luke & Frances Kempe 11
Iſsue of Herbert & Hannah Baker 15
Andrew Baker maternal Grandfather
Eſther Thrope maternal Grandmother
Iſsue of James & Emma Thrope 18
Iſsue of George Stiles Half Blood 0
Iſsue of George & Cecilia Stiles 7
Geoffery Stiles Father
1
Lucy Baker Mother
Lewis Gay ſecond Husband
Iſsue of Andrew & Eſther Baker 14
Iſsue of Geoffery Stiles Half Blood 0
Francis Stiles eldeſt Brother 4
Oliver Stiles ſecond Brother 5
JOHN STILES the Perſon laſt ſeiſed
Bridget Stiles Sister 6
Alice Stiles Sister 6
Iſsue of Lucy Gay Half Blood 0
Matthew Stiles eldeſt Son 1
Gilbert Stiles ſecond Son 2
Margaret Stiles Daughter 3
Charlotte Stiles Daughter 3

A. Bell Sculp.

3 MA 55

In this ſenſe, it is the ſimple contour, or outlines, of the figures intended to be repreſented, or the lines that terminate and circumſcribe them: ſuch deſign is ſometimes drawn in crayons, or ink, without any ſhadows at all; ſometimes it is hatched, that is, the ſhadows are expreſſed by ſenſible outlines, uſually drawn acroſs each other with the pen, crayon, or graver. Sometimes, again, the ſhadows are done with the crayon rubbed ſo as that there do not appear any lines: at other times, the grains or ſtrokes of the crayon appear, as not being rubbed: ſometimes the deſign is waſhed, that is, the ſhadows are done with a pencil in Indian ink, or ſome other liquor; and ſometimes the deſign is coloured, that is, colours are laid on much like thoſe intended for the grand work.

Design, in muſic, is juſtly defined by Rouſſeau to be the invention and the conduct of the ſubject, the diſpoſition of every part, and the general order of the whole.

It is not ſufficient to form beautiful airs, and a legitimate harmony; all theſe muſt be connected by a principal ſubject, to which all the parts of the work relate, and by which they became one. Thus unity ought to prevail in the air, in the movement, in the character, in the harmony, and in the modulation. All theſe muſt indiſpenſably relate to one common idea which unites them. The greateſt difficulty is, to reconcile the obſervation of thoſe precepts with an elegant variety, which, if not introduced, renders the whole piece irkſome and monotonic. Without queſtion the muſician, as well as the poet, and the painter, may riſk every thing in favour of this delightful variety; if, under the pretext of contraſting, they do not endeavour to cheat us with falſe appearances, and inſtead of pieces juſtly and happily planned, preſent us with a muſical minced-meat, compoſed of little abortive fragments, and of characters ſo incompatible, that the whole aſſembled forms a heterogeneous monſter.

> *Non ut placidis coeant immitia, non ut*
> *Serpentis avibus geminentur, tigribus agni.*

Tranſlated thus:

> But not that nature ſhould revers'd appear;
> Mix mild with fierce, and gentle with ſevere;
> Profane her laws to contradiction's height;
> Tygers with lambs, with ſerpents birds unite.

It is therefore in a diſtribution formed with intelligence and taſte, in a juſt proportion between all the parts, that the perfection of deſign conſiſts; and it is above all, in this point, that the immortal pergoleſo has ſhown his judgment and his taſte, and has left ſo far behind him all his competitors. His *Stabat Mater*, his *Orfeo*, his *Serva Padrona*, are, in three different ſpecies of compoſition, three maſter pieces of *deſign* equally perfect.

This idea of the general deſign of a work, is likewiſe particularly applicable to every piece of which it conſiſts; thus the compoſer plans an air, a duett, a chorus, &c. For this purpoſe, after having invented his ſubject, he diſtributes it, according to the rules of a legitimate modulation, into all the parts where it ought to be perceived, in ſuch a proportion, that its impreſſion may not be loſt on the minds of the audience; yet that it may never be reiterated in their ears, without the graces of novelty. The compoſer errs in deſigning who ſuffers his ſubject to be forgot; he is ſtill more culpable who purſues it till it becomes trite and tireſome.

DESPORTES (Francis), a French painter of the 18th century, was born in Champagne, in 1661. He acquired great reputation, not only in France, but in England and Poland: he particularly excelled in ſtill life. He was received into the academy of painting, made pictures for the tapeſtry of the Gobelins, and died at Paris in 1743.

DESPOT, a term ſometimes uſed for an abſolute prince. See the next article.

Under the emperors of Conſtantinople, *deſpot* was a title of honour given to the emperor's ſons, or ſons-in-law; as alſo to their colleagues and partners in the imperial dignity, in the ſame manner as Cæſar was at Rome. See Cæsar.

DESPOTICAL, in general, denotes any thing that is uncontrolled and abſolute; but is particularly uſed for an arbitrary government, where the power of the prince is unlimited, and his will a law to his ſubjects: ſuch are thoſe of Turky, Perſia, and moſt of the eaſtern governments; and even thoſe of Europe, if we except the republics, our own, and the Swediſh government.

DESPOUILLE', in heraldry, the whole caſe, ſkin, or ſlough of a beaſt, with the head, feet, tail, and all appurtenances, ſo that being filled and ſtuffed it looks like the entire creature.

DESSAW, a city of upper Saxony, in Germany, ſituated on the river Elbe, 60 miles north-weſt of Dreſden, and ſubject to the prince of Anhalt Deſſaw: E. Long. 12. 40. N. Lat. 51. 50.

DESSERT, or Desert, a ſervice of fruits and ſweetmeats, uſually ſerved up laſt to table.

DESSICCATIVE, or Desiccative, in pharmacy, an epithet applied to ſuch topical medicines as dry up the humours flowing to a wound or ulcer.

DESTINIES, in mythology. See Parcæ.

DESTINY, among philoſophers and divines. See Fate.

DESTRUCTION, in general, an alteration of any thing from its natural ſtate to one contrary to nature; whereby it is deemed the ſame with Corruption.

A chemical deſtruction, or corruption, is nothing but a reſolution of the whole naturally mixt body into its parts.

DESUDATION, in medicine, a profuſe and inordinate ſweat, ſucceeded by an eruption of puſtules, called *ſudamina*, or *heat pimples*.

DESULTOR, in antiquity, a vaulter or leaper, who, leading one horſe by the bridle, and riding another, jumped from the back of one to the other, as the cuſtom was after they had run ſeveral courſes or heats.—This practice required great dexterity, being performed before the uſe of either ſadles or ſtirrups. The cuſtom was practiſed in the army when neceſſity required it; but chiefly amongſt the Numidians, who always carried with them two horſes at leaſt for that purpoſe, changing them as they tired. The Greeks and Romans borrowed the practice from them; but only uſed it at races, games, &c. The Sarmatæ were great maſters of this exerciſe, and the Huſſars have ſtill ſome ſmall remains of it.

DETACHMENT, in military affairs, a certain number of ſoldiers drawn out from ſeveral regiments or companies equally, to be employed as the general thinks proper, whether on an attack, at a ſiege, or in parties to ſcower the country.

DETERGENTS, in pharmacy, ſuch medicines as are not only ſoftening and adheſive, but alſo, by a peculiar activity, conjoined with a ſuitable configuration of parts, are apt to abrade and carry along with them ſuch particles as they lay hold on in their paſſage.

DETERIORATION, the impairing or rendering a thing worſe: it is juſt the reverſe of MELIORATION.

DETERMINATION, in mechanics, ſignifies much the ſame with the tendency or direction of a body in motion. See MECHANICS.

DETERMINATION, among ſchool-divines, is an act of divine power, limiting the agency of ſecond cauſes, in every inſtance, to what the Deity predeſtinated concerning them. See PREDESTINATION.

DETERSIVES, the ſame with DETERGENTS.

DETINUE, in law, a writ or action that lies againſt one who has got goods or other things delivered to him to keep, and afterwards refuſes to deliver them.—In this action, the thing detained is generally to be recovered, and not damages; but if one cannot recover the thing itſelf, he ſhall recover damages for the thing, and alſo for the detainer. Detinue lies for any thing certain and valuable, wherein one may have a property or right; as for a horſe, cow, ſheep, hens, dogs, jewels, plate, cloth, bags of money, ſacks of corn, &c. It muſt be laid ſo certain, that the thing detained may be known and recovered: and therefore, for money out of a bag, or corn out of a ſack, &c. it lies not; for the money or corn cannot in this caſe be known from other money or corn; ſo that the party muſt have an action on the caſe, &c. Yet detinue may be brought for a piece of gold of the price of 22 ſh. though not for 22 ſh. in money.

DETONATION, in chemiſtry, ſignifies an exploſion with noiſe made by the ſudden inflammation of ſome combuſtible body: Such are the exploſions of *gun-powder*, *fulminating gold*, and *fulminating powder*. As nitre is the cauſe of moſt exploſions, the word *detonation* has been appropriated to the inflammation of the acid of this ſalt with bodies containing phlogiſton; and it is frequently given to thoſe inflammations of nitrous acid which are not accompanied with exploſion. Thus nitre is ſaid to detonate with ſulphur, with coals, with metals; although in the ordinary method of making theſe operations, that is, in open crucibles, and with ſmall quantities of detonating ſubſtances, the nitre does not truly explode. See NITRE.

DETRANCHE, in heraldry, a line bend-wiſe, proceeding always from the dexter-ſide, but not from the very angle diagonally athwart the ſhield.

DETTINGEN, a village of Germany, in the circle of the Upper Rhine, and in the territory of Hanau. Here the Auſtrians and the Britiſh, in June 1743, were attacked by the French, who met with a repulſe; but as the allies were inferior in number, they did not make the advantage of it they might have done. E. Long. 8. 45. N. Lat. 50. 8.

DEUCALION, king of Theſſaly. The flood ſaid to have happened in his time, (1500 B. C.), was no more than an inundation of Theſſaly, occaſioned by heavy rains, and an earthquake that ſtopped the courſe of the river Peneus where it uſually diſcharged itſelf into the ſea. On theſe circumſtances the fable of Deucalion's flood is founded.—According to the fable, he was the ſon of Prometheus. He governed his people with equity; but the reſt of mankind being extremely wicked, were deſtroyed by a flood, while Deucalion and Pyrrha his queen ſaved themſelves by aſcending mount Parnaſſus. When the waters were decreaſed, they went and conſulted the oracle of Themis, on the means by which the earth was to be repeopled; when they were ordered to veil their heads and faces, to unlooſe their girdles, and throw behind their backs the bones of their great mother. At this advice Pyrrha was ſeized with horror: but Deucalion explained the myſtery, by obſerving, that their great mother muſt mean the earth, and her bones the ſtones; when taking them up, thoſe Deucalion threw over his head became men, and thoſe thrown by Pyrrha, women.

DEVENSHRING. See DEVONSHEERING.

DEVENTER, a large, ſtrong, trading, and populous town of the United Provinces, in Overyſſel, with an univerſity. It is ſurrounded with ſtrong walls, flanked with ſeveral towers, and with ditches full of water. It is ſeated on the river Iſſel, 55 miles eaſt of Amſterdam, and 42 weſt of Benthem. E. Long. 5. 8. N. Lat. 52. 18.

DEVEREUX (Robert), earl of Eſſex, the ſon of Walter Devereux, viſcount Hereford, was born at Netherwood in Herefordſhire, in the year 1567. He ſucceeded to the title of earl of Eſſex at ten years of age; and about two years after, was ſent, by his guardian lord Burleigh, to Trinity-college in Cambridge. He took the degree of maſter of arts in 1582, and ſoon after retired to his ſeat at Lampſie in South-Wales. He did not however continue long in this retreat; for we find him, in his ſeventeenth year, at the court of queen Elizabeth, who immediately honoured him with ſingular marks of her favour. Authors ſeem very unneceſſarily perplexed to account for this young earl's gracious reception at the court of Elizabeth. The reaſons are obvious: he was her relation, the ſon of one of her moſt faithful ſervants, the ſon-in-law of her favourite Leiceſter, and a very handſome and accompliſhed youth. Towards the end of (the following year) 1585, he attended the earl of Leiceſter to Holland; and gave ſignal proofs of his perſonal courage during the campaign of 1586, particularly at the battle of Zutphen, where the gallant Sidney was mortally wounded. On this occaſion the earl of Leiceſter conferred on him the honour of knight banneret.

In the year 1587, Leiceſter being appointed lord ſteward of the houſehold, Eſſex ſucceeded him in the honourable poſt of maſter of the horſe; and the year following, when the queen aſſembled an army at Tilbury to oppoſe the Spaniſh invaſion, Eſſex was made general of the horſe, and knight of the garter. From this time he was conſidered as the happy favourite of the queen. And, if there was any mark yet wanting to fix the people's opinion in that reſpect, it was ſhewn by the queen's conferring on him the honour of the garter.

We need not wonder, that ſo quick an elevation, and to ſo great a height, ſhould affect ſo young a man as the earl of Eſſex; who ſhewed from henceforwards a very high ſpirit, and often behaved petulantly enough to the queen herſelf, who yet did not love to be controlled by her ſubjects. His eagerneſs about this time to diſpute her favour with Sir Charles Blunt, afterwards lord Montjoy and earl of Devonſhire, coſt him ſome blood; for Sir Charles, thinking himſelf affronted by the earl, challenged him, and, after a ſhort diſpute, wounded him in the knee. The queen, ſo far from being diſpleaſed with it, is ſaid to have ſworn a good round oath, that it was fit ſomebody ſhould take him down, otherwiſe there would be no ruling him. However, ſhe reconciled the rivals; who, to their honour, continued good friends as long as they lived.

The gallant Eſſex however was not ſo entirely captivated with his ſituation, as to become inſenſible to the allurements of military glory. In 1589, Sir John Norris and Sir Francis Drake having ſailed on an expedition againſt Spain, our young favourite, without the permiſſion or knowledge of his royal miſtreſs, followed the fleet; which he joined as they were ſailing towards Liſbon, and acted with great reſolution in the repulſe of the Spaniſh garriſon of that city. The queen wrote him a very ſevere letter on the occaſion; but ſhe was, after his return, ſoon appeaſed. Yet it was not long before he again incurred her diſpleaſure, by marrying the widow of Sir Philip Sidney. In 1591, he was ſent to France with the command of 4000 men to the aſſiſtance of Henry IV. In 1596, he was joined with the lord high admiral Howard in the command of the famous expedition againſt Cadiz, the ſucceſs of which is univerſally known. In 1597, he was appointed maſter of the ordnance; and the ſame year commanded another expedition againſt Spain, called the *Iſland voyage*, the particulars of which are alſo well known.

Soon after his return, he was created earl marſhal of England; and on the death of the great lord Burleigh, in 1598, elected chancellor of the univerſity of Cambridge. This is reckoned one of the laſt inſtances of this great man's felicity, who was now advanced too high to ſit at eaſe; and thoſe who longed for his honours and employments, very cloſely applied themſelves to bring about his fall. The firſt great ſhock he received, in regard to the queen's favour, aroſe from a warm diſpute between her majeſty and himſelf, about the choice of ſome fit and able perſon to ſuperintend the affairs of Ireland. The affair is related by Camden; who tells us, that nobody was preſent but the lord admiral, Sir Robert Cecil ſecretary, and Windebank clerk of the ſeal. The queen looked upon Sir William Knolls, uncle to Eſſex, as the moſt proper perſon for that charge: Eſſex contended, that Sir George Carew was a much fitter man for it. When the queen could not be perſuaded to approve his choice, he ſo far forgot himſelf and his duty, as to turn his back upon her in a contemptuous manner; which inſolence her majeſty not being able to bear, gave him a box on the ear, and bid him go and be hanged. Eſſex, like a blockhead, put his hand to his ſword, and ſwore revenge. Where was his gallantry on this occaſion? Could a ſtroke from an angry woman tinge the honour of a gallant ſoldier? This violent ſtorm, however, ſoon ſubſided; and they were again reconciled, at leaſt apparently.

The total reduction of Ireland being brought upon the tapis ſoon after, the earl was pitched upon as the only man from whom it could be expected. This was an artful contrivance of his enemies, who hoped by this means to ruin him; nor were their expectations diſappointed. He declined this fatal preferment as long as he could: but, perceiving that he ſhould have no quiet at home, he accepted it; and his commiſſion for lord lieutenant paſſed the great ſeal on the 12th of March 1598. His enemies now began to inſinuate, that he had ſought this command, for the ſake of greater things which he then was meditating; but there is a letter of his to the queen, preſerved in the Harleian collections, which ſhews, that he was ſo far from entering upon it with alacrity, that he looked upon it rather as a baniſhment, and a place aſſigned him for a retreat from his ſovereign's diſpleaſure, than a potent government beſtowed upon him by her favour.

“ *To the Queen.* From a mind delighting in ſorrow; from ſpirits waſted with paſſion; from a heart torn in pieces with care, grief, and travail; from a man that hateth himſelf, and all things elſe that keep him alive; what ſervice can your majeſty expect, ſince any ſervice paſt deſerves no more than baniſhment and proſcription to the curſedeſt of all iſlands? It is your rebels pride and ſucceſſion muſt give me leave to ranſom myſelf out of this hateful priſon, out of my loathed body; which, if it happen ſo, your majeſty ſhall have no cauſe to miſlike the faſhion of my death, ſince the courſe of my life could never pleaſe you.

“ Happy he could finiſh forth his fate,
“ In ſome unhaunted deſart moſt obſcure
“ From all ſociety, from love and hate
“ Of worldly folk; then ſhould he ſleep ſecure.

“ Then wake again, and yield God ever praiſe,
“ Content with hips, and hawes, and brambleberry;
“ In contemplation paſſing out his days,
“ And change of holy thoughts to make him merry.

“ Who, when he dies, his tomb may be a buſh,
“ Where harmleſs robin dwells with gentle thruſh.

“ Your Majeſty's exiled ſervant,
“ ROBERT ESSEX.”

The earl met with nothing in Ireland but ill ſucceſs and croſſes: in the midſt of which, an army was ſuddenly raiſed in England, under the command of the earl of Nottingham; no-body well knowing why, but in reality from the ſuggeſtions of the earl's enemies to the queen, that he rather meditated an invaſion on his native country, than the reduction of the Iriſh rebels. This and other conſiderations made him reſolve to quit his poſt, and come over to England; which he accordingly did without leave. He burſt into her majeſty's bed-chamber as ſhe was riſing, and ſhe received him with a mixture of tenderneſs and ſeverity: but ſhe, ſoon after, thought fit to deprive him of all his employments, except that of maſter of the horſe. He was committed to the cuſtody of the lord-keeper, with whom he continued ſix months. No ſooner had he regained his liberty, than he was guilty of many extravagancies; to which he was inſtigated by knaves and fools, but perhaps more powerfully by his own paſſions. He firſt determined to obtain an audience of the queen by force. He refuſed to attend the council when ſummoned. When the queen ſent the lord-keeper, the lord chief-juſtice, and two others, to know his grievances, he confined them; and then marched with his friends into the city, in expectation that the people would riſe in his favour; but in that he was diſappointed. He was at laſt beſieged, and taken in his houſe in Eſſex-ſtreet; committed to the Tower; tried by his peers, condemned, and executed. Thus did this brave man, this favourite of his queen, this idol of the people, fall a ſacrifice to his want of that diſſimulation, that cunning, that court-policy, by which his enemies were enabled to effect his ruin. He was a polite ſcholar, and a generous friend to literature.

To thoſe, who have not taken the trouble to conſult and compare the ſeveral authors who have related the ſtory of this unfortunate earl, it muſt appear wonderful, if, as hath been ſuggeſted, he was really beloved by queen Elizabeth, that ſhe could conſent to his execution. Now, that ſhe had conceived a tender paſſion for him, is proved beyond a doubt by Mr Walpole in his very entertaining and inſtructive *Catalogue of Noble Authors.*—"I am aware," ſays that author, "that it is become a mode to treat the queen's paſſion for him as a romance. Voltaire laughs at it; and obſerves, that when her ſtruggle about him muſt have been the greateſt (the time of his death), ſhe was ſixty-eight.—Had *he* been ſixty-eight, it is probable ſhe would *not* have been in love with him."—"Whenever Eſſex acted a fit of ſickneſs, not a day paſſed without the queen's ſending often to ſee him; and once went ſo far as to ſit long by him, and order his *broths and things*. It is recorded by a diligent obſerver of that court, that in one of his ſick moods, he took the liberty of going up to the queen in his night-gown. In the height of theſe fretful fooleries, there was a maſk at Black Fryars on the marriage of lord Herbert and Mrs Ruſſel. Eight lady-maſkers choſe eight more to dance the meaſures. Mrs Fitton, who led them, went to the queen, and wooed her to dance. Her majeſty aſked what ſhe was?—*Affection*, ſhe ſaid. *Affection!* ſaid the queen; *Affection is falſe*. Were not theſe the murmurs of a heart ill at eaſe? Yet her majeſty roſe, and danced. She was then ſixty-eight. Sure it was as natural for her to be in love."

Mr Walpole farther obſerves, that her court and cotemporaries had an uniform opinion of her paſſion for Eſſex, and quotes ſeveral inſtances from a letter written by Sir Francis Bacon to the earl; in which, among other things, he adviſes him to conſult her taſte in his very apparel and geſtures, and to give way to any other inclination ſhe may have. Sir Francis adviſed the queen herſelf, knowing her inclination, to keep the earl about her for *ſociety*. What Henry IV. of France thought of the queen's affection for Eſſex, is evident from what he ſaid to her embaſſador—"*Que ſa majeſté ne laiſſeroit jamais ſon couſin d'Eſſex eſloigner de ſon cotillon.*"—After his confinement, on hearing he was ill, ſhe ſent him word, with tears in her eyes, that if ſhe might with her honour, ſhe would viſit him.

"If," ſays Mr Walpole, "theſe inſtances are problematic, are the following ſo? In one of the curious letters of Rowland White, he ſays, *the queen hath of late uſed the fair Mrs Bridges with words and blows of anger*. In a ſubſequent letter, he ſays, *the earl is again fallen in love with his faireſt B. It cannot chuſe but come to the queen's ears, and then he is undone.*"—Eſſex himſelf ſays, that her fond parting with him when he ſet out for Ireland, pierced his very ſoul.

Probably the reader has now very little doubt as to queen Elizabeth's affection for the unfortunate Eſſex; but, in proportion to our belief of the exiſtence of this affection, her motives for conſenting to his execution become more inexplicable. Queen Elizabeth had a very high opinion of her beauty and perſonal attractions, and probably expected more entire adoration than the earl's paſſion for variety would ſuffer him to pay. Towards the latter end of her life, ſhe was certainly an object of diſguſt. He had too much honeſt ſimplicity in his nature, to feign a paſſion which he did not feel. She fooliſhly gave credit to the ſtories of his ambitious projects incompatible with her ſafety; and was informed that he had once inadvertently ſaid, that *ſhe grew old and cankered, and that her mind was become as crooked as her carcaſe*. If this be true, where is the woman that would not ſacrifice ſuch a lover to her reſentment?

It is ſaid, however, that, concerning his execution, her majeſty was irreſolute to the laſt, and ſent orders to countermand it; but, conſidering his obſtinacy in refuſing to aſk her pardon, afterwards directed that he ſhould die. It is reported, that the queen, in the height of her paſſion for the earl of Eſſex, had given him a ring, ordering him to keep it, and that whatever crime he ſhould commit, ſhe would pardon him when he ſhould return that pledge. The earl, upon his condemnation, applied to admiral Howard's lady, his relation, deſiring her, by a perſon whom ſhe could truſt, to return it into the queen's own hands; but her huſband, who was one of the earl's greateſt enemies, and to whom ſhe had imprudently told the circumſtance, would not ſuffer her to acquit herſelf of the commiſſion; ſo that the queen conſented to the earl's death, being full of indignation againſt ſo proud and haughty a ſpirit, who choſe rather to die than implore her mercy. Some time after, the admiral's lady fell ſick, and being near her death, ſhe ſent word to the queen that ſhe had ſomething of great conſequence to communicate before ſhe died. The queen came to her bed-ſide, and having ordered all her attendants to withdraw, the lady returned, but too late, the ring, deſiring to be excuſed that ſhe did not return it ſooner: on which, it is ſaid, the queen immediately retired, overwhelmed with grief.

The earl of Eſſex died in the thirty-fourth year of his age; leaving by his lady, one ſon and two daughters.

DEVICE, among painters. See DEVISE.

DEVIL, an evil angel, one of thoſe celeſtial ſpirits caſt down from heaven for pretending to equal himſelf with God. The Ethiopians paint the devil white, to be even with the Europeans who paint him black.

There is no mention of the word *devil* in the Old Teſtament, but only of the word *Satan* and *Belial:* nor do we meet with it in any heathen authors, in the ſenſe it is taken among Chriſtians, that is, as a creature revolted from God. Their theology went no farther than to evil genii, or dæmons.

Some of the American idolaters have a notion of two collateral independent beings, one of whom is good, and the other evil; which laſt they imagine has the direction and ſuperintendance of this earth, for which reaſon they chiefly worſhip him: whence thoſe that give us an account of the religion of theſe ſavages give out, with ſome impropriety, that they worſhip the devil. The Chaldeans, in like manner, believed both a good principle and an evil one; which laſt they imagined was an enemy to mankind.

Iſaiah, ſpeaking, according to ſome commentators, of the fall of the devil, calls him Lucifer, from his former elevation and ſtate of glory: but others explain this paſſage of Iſaiah in reference to the king of Babylon, who had been precipitated from his throne and glory. The Arabians call Lucifer, *Eblis;* which ſome think is only a diminutive or corruption of the word *Diabolus*.

Devil *on the Neck*, a tormenting engine made of iron, ſtraitening and wincing the neck of a man, with his legs together, in a horrible manner; ſo that the more he ſtirreth in it, the ſtraiter it preſſeth him; formerly in uſe among the perſecuting papiſts.

DEVINCTION, in antiquity, a kind of love-charm, deſcribed by Virgil in his eighth eclogue: it conſiſted in tying certain knots, and repeating a formula of words.

DEVISE, or Device, in heraldry, painting, and ſculpture, any emblem uſed to repreſent a certain family, perſon, action, or quality; with a ſuitable motto, applied in a figurative ſenſe. See Motto.

The eſſence of a device conſiſts in a metaphorical ſimilitude between the things repreſenting and repreſented: thus, a young nobleman, of great courage and ambition, is ſaid to have borne for his deviſe, in a late carouſal at the court of France, a rocket mounted in the air, with this motto in Italian, "*poco duri purche m'inalzi;*" expreſſing, that he preferred a ſhort life, provided he might thereby attain to glory and eminence.

The Italians have reduced the making of deviſes into an art, ſome of the principal laws of which are theſe. 1. That there be nothing extravagant or monſtrous in the figures. 2. That figures be never joined which have no relation or affinity with one another; excepting ſome whimſical unions eſtabliſhed in ancient fables, which cuſtom has authoriſed. 3. That the human body be never uſed. 4. The fewer figures the better. 5. The motto ſhould be every way ſuitable.

Deviſe, in law, the act whereby a perſon bequeaths his lands or tenements to another by his laſt will or teſtament.

DEUNX, in Roman antiquity, 11 ounces, or $\frac{11}{12}$ of the Libra.

DEVOLUTION, in law, a right acquired by ſucceſſion from one to another.

DEVONSHEERING, a term uſed by the farmers to expreſs the burning of land by way of manure: the method is to cut off the turf about four inches thick, and burn it in heaps, and then ſpread the aſhes upon the land. The name is probably derived from its having been earlieſt practiſed in Devonſhire.

DEVONSHIRE, a county of England, bounded on the ſouth by the Engliſh channel, on the north by the Briſtol channel, on the eaſt by Somerſetſhire, and on the weſt by Cornwall. It is about 69 miles long, and 66 broad. The ſoil is various; in the weſtern parts of the county it is coarſe and mooriſh, bad for ſheep, but proper for black cattle. In the northern parts, the dry ſoil and downs are well adapted to ſheep, with numerous flocks of which they are well covered. Tolerable crops of corn are alſo produced there when the land is well manured. The ſoil of the reſt of the country is rich and fertile both in corn and paſture, yielding alſo in ſome places plenty of marle for manuring it. In other places they pare off and burn the ſurface, making uſe of the aſhes as a manure. Dr Campbell ſtyles it a rich and pleaſant country; as in different parts it abounds with all ſorts of grain, produces abundance of fruit, has mines of lead, iron, and ſilver, in which it formerly exceeded Cornwall, though now it is greatly inferior. On the coaſt alſo they have herring and pilchard fiſheries.

DEVOTION, devotio, a ſincere ardent worſhip of the Deity. See Prayer, Adoration, Worship, &c.

Devotion, as defined by Jurieu, is a ſoftening and yielding of the heart, with an internal conſolation, which the ſouls of believers feel in the practice or exerciſe of piety. By devotion is alſo underſtood certain religious practices, which a perſon makes it a rule to diſcharge regularly; and with reaſon, if the exactitude be founded on ſolid piety, otherwiſe it is vanity or ſuperſtition. That devotion is vain and trifling, which would accommodate itſelf both to God and to the world. *Trevoux.*

Devotion, among the Romans, was a kind of ſacrifice, or ceremony, whereby they conſecrated themſelves to the ſervice of ſome perſon. The ancients had a notion, that the life of one might be ranſomed by the death of another, whence thoſe devotions became frequent for the lives of the emperors. Devotion to any particular perſon, was unknown among the Romans till the time of Auguſtus. The very day after the title of Auguſtus had been conferred upon Octavius, Pacuvius, a tribune of the people, publicly declared, that he would devote himſelf to Auguſtus, and obey him at the expence of his life, (as was the practice among barbarous nations), if he was commanded. His example was immediately followed by all the reſt; till, at length, it became an eſtabliſhed cuſtom never to go to ſalute the emperor, without declaring that they were devoted to him.—Before this, the practice of the Romans was that of devoting themſelves to their country *.

DEUTEROCANONICAL, in the ſchool-theology, an appellation given to certain books of holy ſcripture, which were added to the canon after the reſt; either by reaſon they were not wrote till after the compilation of the canon, or by reaſon of ſome diſpute as to their canonicity. The word is Greek, being compounded of δευτερος, *ſecond*, and κανονικος, *canonical.*

The Jews, it is certain, acknowledged ſeveral books in their canon, which were put there later than the reſt. They ſay, that under Eſdras, a great aſſembly of their doctors, which they call by way of eminence the *great ſynagogue*, made the collection of the ſacred books which we now have in the Hebrew Old Teſtament. And they agree that they put books therein which had not been ſo before the Babyloniſh captivity; ſuch are thoſe of Daniel, Ezekiel, Haggai, &c. and thoſe of Eſdras and Nehemiah.

And the Romiſh church has ſince added others to the canon, that were not, nor could not be, in the canon of the Jews; by reaſon ſome of them were not compoſed till after. Such is the book of Eccleſiaſticus; with ſeveral of the apocryphal books, as the Maccabees, Wiſdom, &c. Others were added ſtill later, by reaſon their canonicity had not been yet examined; and till ſuch examen, and judgment, they might be ſet aſide at pleaſure.—But ſince that church has pronounced as to the canonicity of theſe books, there is no more room now for her members to doubt of them, than there was for the Jews to doubt of thoſe of the canon of Eſdras. And the deuterononical books are with them as canonical, as the proto-canonical; the only difference between them conſiſting in this, that the canonicity of the one was not generally known, examined, and ſettled, ſo ſoon as that of the others.

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* See *Decius.*

The deuterocanonical books in the modern canon, are the book of Eſther, either the whole, or at leaſt the ſeven laſt chapters thereof. The epiſtle to the Hebrews; that of James; and that of Jude; the ſecond of St Peter; the ſecond and third of St John; and the Revelation. The deuterocanonical parts of books, are, in Daniel, the hymn of the three children; the prayer of Azariah; the hiſtories of Suſannah, of Bel and the Dragon; the laſt chapter of St Mark; the bloody ſweat, and the appearance of the angel, related in St Luke, chap. xxii; and the hiſtory of the adulterous woman in St John, chap. viii.

DEUTERONOMY, one of the ſacred books of the Old Teſtament; being the laſt of thoſe written by Moſes: (See PENTATEUCH.) The word is Greek, compounded of δευτερος *ſecond*, and νομος, *law*.

Deuteronomy was written the 40th year after the delivery from Egypt, in the country of the Moabites beyond Jordan; Moſes being then in the 120th year of his age. It contains, in Hebrew, 11 paraſches, though only 10 in the edition of the rabbins at Venice; XX chapters, and 955 verſes. In the Greek, Latin, and other verſions, it contains XXXIV chapters. The laſt is not of Moſes. Some ſay it was added by Joſhua immediately after Moſes's death; which is the moſt probable opinion. Others will have it added by Eſdras.

DEUTEROPOTMI, in Grecian antiquity, a deſignation given to ſuch of the Athenians as had been thought dead, and, after the celebration of the funeral rites, unexpectedly recovered. It was unlawful for the deuteropotmi to enter into the temple of the Eumenides, or to be admitted to the holy rites, till after they were purified, by being let through the lap of a woman's gown, that they might ſeem to be new born.

DEUTEROSIS, the Greek name by which the Jews called their Miſchnah, or ſecond law. See MISCHNAH.

DEW, a denſe, moiſt vapour, found on the earth in ſpring and ſummer mornings, in form of a miſling rain, being collected there chiefly while the ſun is below the horizon.

It hath been diſputed whether the dew is formed from the vapours *aſcending* from the earth during the night-time, or from the *deſcent* of ſuch as have been already raiſed through the day. The moſt remarkable experiments adduced in favour of the firſt hypotheſis are thoſe of Mr Dufay of the Royal Academy of Sciences at Paris. He ſuppoſed, that if the dew *aſcended*, it muſt wet a body placed low down ſooner than one placed in a higher ſituation: and, if a number of bodies were placed in this manner, the lowermoſt would be wetted firſt; and the reſt in like manner, gradually up to the top.

To determine this, he placed two ladders againſt one another, meeting at their tops, ſpreading wide aſunder at the bottom, and ſo tall as to reach 32 feet high. To the ſeveral ſteps of theſe he faſtened large ſquares of glaſs like the panes of windows, placing them in ſuch a manner that they ſhould not overſhade one another. On the trial it appeared exactly as Mr Dufay had apprehended. The lower ſurface of the loweſt piece of glaſs was firſt wetted, then the upper, then the lower ſurface of the pane next above it; and ſo on, till all the pieces were wetted to the top. Hence it appeared plain to him, that the dew conſiſted of the vapours aſcending from the earth during the night-time; which, being condenſed by the coldneſs of the atmoſphere, are prevented from being diſſipated as in the day-time by the ſun's heat. He afterwards tried a ſimilar experiment with pieces of cloth inſtead of panes of glaſs, and the reſult was quite conformable to his expectations. He weighed all the pieces of cloth next morning, in order to know what quantity of water each had imbibed, and found thoſe that had been placed lowermoſt conſiderably heavier than ſuch as had been placed at the top; tho' he owns that this experiment did not ſucceed ſo perfectly as the former.

M. Muſchenbroek, who embraced the contrary opinion, thought he had invalidated all Mr Dufay's proofs, by repeating his experiments, with the ſame ſucceſs, on a plane covered with ſheet-lead. But to this Mr Dufay replied, that there was no occaſion for ſuppoſing the vapour to riſe through the lead, nor from that very ſpot; but that as it aroſe from the adjoining open ground, the continual fluctuation of the air could not but ſpread it abroad, and carry it thither in its aſcent.

But though this experiment of M. Muſchenbroek's is not ſufficient to overthrow thoſe of Mr Dufay, it muſt ſtill remain dubious whether the dew *riſes* or *falls*. One thing which ſeems to favour the hypotheſis of its *deſcent* is, that in cloudy weather there is little or no dew to be obſerved. From this M. de Luc brings an argument in favour of the hypotheſis juſt now mentioned. He accounts for it in the following manner. When there are no clouds in the air, the heat of the inferior air and that which riſes from the earth, diſſipates itſelf into the ſuperior regions; and then the vapours which are diſperſed throughout the air, condenſe, and fall down in dew: But, when the clouds continue, they ſeparate the inferior from the ſuperior part of the atmoſphere, and thus prevent the diſſipation of the heat, by which means the vapours remain ſuſpended. When the ſky grows cloudy, ſome hours after ſun-ſet, although the heat has been ſenſibly diminiſhed, it is again increaſed; becauſe, continuing to riſe out of the earth, it is accumulated in the inferior air. But neither can this be reckoned a poſitive proof of the *deſcent* of the dew; ſince we may as well ſuppoſe the heat of the atmoſphere to be great enough to diſſipate it in its aſcent, as to keep it ſuſpended after its aſcent through the day.

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On the other hand, its being found in greater quantities on bodies placed low down than on ſuch as are high up, is no proof of the *aſcent* of the dew; becauſe the ſame thing is obſerved of rain. A body placed low down receives more rain than one placed in an elevated ſituation; and yet the rain certainly deſcends from the atmoſphere. The reaſon why the dew appears firſt on the lower parts of bodies may be, that, in the evening, the lower part of the atmoſphere is firſt cooled, and conſequently moſt diſpoſed to part with its vapour. It is alſo certain, that part of the water contained in the air may be condenſed at any time on the ſides of a glaſs, by means of cold, ſo as to run down its ſides in ſmall drops like dew. It ſeems, therefore, that this ſubject is not ſufficiently determined by ſuch experiments as have yet been made; nor indeed does it appear eaſy to make ſuch experiments as ſhall be perfectly *deciſive* on the matter.

Several ſubſtances, expoſed to the ſame dew, receive and charge themſelves with it in a very different manner; ſome more, others leſs, and ſome even not at all. The drops ſeem to make a ſort of choice of what bodies they ſhall affix themſelves to: glaſs and cryſtals are thoſe to which they adhere in the moſt ready manner, and in the largeſt quantity; but metals of all kinds never receive them at all, nor do the drops ever adhere to them. The reaſon of this is probably becauſe metals promote evaporation more than glaſs does. Thus, if a piece of metal and a piece of glaſs are both made equally moiſt, the former will be found to dry in much leſs time than the latter. Hence it would ſeem, that there is between metals and water ſome kind of repulſion: and this may be ſufficient to keep off the very ſmall quantity that falls in dew; for whatever tends to make water evaporate after it is actually in contact with any ſubſtance, alſo tends to keep the water from ever coming into contact with it.

SUBSTANCES of a very different kind from the uſual dew, are ſaid to have ſometimes fallen from the atmoſphere. In the Phil. Tranſ. we are told, that in the year 1695 there fell in Ireland, in the provinces of Leinſter and Munſter, for a conſiderable part of the winter and ſpring, a fatty ſubſtance reſembling butter, inſtead of the common dew. It was of a clammy texture, and dark yellow colour; and was, from its great reſemblance, generally called *dew-butter* by the country people. It always fell in the night, and chiefly in the mooriſh low grounds; and was found hanging on the tops of the graſs, and on the thatch of the houſes of the poor people. It was ſeldom obſerved to fall twice in the ſame place; and uſually, wherever it fell, it lay a fortnight upon the ground before it changed colour; but after that it gradually dried up, and became black. The cattle fed in the fields where it lay as well as in others, and received no harm by it. It fell in pieces of the bigneſs of one's finger-end; but they were diſperſed ſcatteringly about, and it had an offenſive ſmell like a church-yard. There were in the ſame places very ſtinking fogs during the winter, and ſome people ſuppoſed this no other than a ſediment from the fog. It would not keep very long, but never bred worms.

May-DEW whitens linen and wax; the dew of autumn is converted into a white froſt. Out of dew putrified by the ſun, ariſe divers inſects, which change apace from one ſpecies into another: what remains is converted into a fine white ſalt, with angles like thoſe of ſalt-petre, after a number of evaporations, calcinations, and fixations.

There is a ſpirit drawn from May-dew, which has wonderful virtues attributed to it. The method of collecting and preparing it, is preſcribed by Hanneman, phyſician at Kiel. It is to be gathered in clean linen cloths; expoſed to the ſun in cloſe vials; then diſtilled, and the ſpirit thrown upon the caput mortuum; this is to be repeated till the earth unite with the ſpirit, and become liquid; which happens about the ſeventh or eighth cohobation, or diſtillation. By ſuch means you gain a very red, odoriferous ſpirit. Stolterfoht, a phyſician of Lubec, thinks May-dew may be gathered in glaſs-plates, eſpecially in ſtill weather, and before ſun-riſe. And Etmuller is of the ſame ſentiment. It might likewiſe be collected with a glaſs funnel, expoſed to the air, having a crooked neck to bring the dew into a vial in a chamber. See Phil. Tranſ. n° 3. Hoffman, and others. It is apparently from the preparation of this dew, that the brothers of the Roſy-Croſs took their denomination *.

DEW-*Born*, in country affairs, a diſtemper in cattle, being a ſwelling in the body, as much as the ſkin can hold, ſo that ſome beaſts are in danger of burſting. This diſtemper proceeds from the greedineſs of a beaſt to feed, when put into a rank paſture: but commonly when the graſs is full of water. In this caſe the beaſt ſhould be ſtirred up and down, and made to purge well: but the proper cure is bleeding in the tail; then take a grated nutmeg, with an egg, and breaking the top of the ſhell, put out ſo much of the white as you may have room to ſlip the nutmeg into the ſhell; mix them together, and then let ſhell and all be put down the beaſt's throat; that done, walk him up and down, and he will ſoon mend.

DEW-*Worm*. See LUMBRICUS.

DE WIT (John), the famous penſionary, was born in 1625, at Dort; where he proſecuted his ſtudies ſo diligently, that, at the age of 23, he publiſhed *Elementa Curvarum Linearum*, one of the deepeſt books in mathematics at that time. After taking his degrees, and travelling, he, in 1650, became penſionary of Dort, and diſtinguiſhed himſelf very early in the management of public affairs. He oppoſed with all his power the war between the Engliſh and the Dutch; and when the event juſtified his predictions, he was unanimouſly choſen penſionary of Holland. In this capacity he laboured to procure a peace with Cromwell; in which peace a ſecret article was introduced by one ſide or other, for the excluſion of the houſe of Orange. In the war with England after the king's reſtoration, when it was thought expedient, on Opdam's defeat and death, that ſome of their own deputies ſhould command the fleet, he was one of the three put in commiſſion; and wrote an accurate relation of all that happened during the expedition he was engaged in, for which, at his return, he received the ſolemn thanks of the States-General. In 1667, he eſtabliſhed the perpetual edict for aboliſhing the office of Stadtholder, to fix the liberty of the republic, as it was hoped, on a firm baſis; which produced ſeditions and tumults, that reſtored the office, on pretence that the De Wits were enemies to the houſe of Orange, and plundered the ſtate. The penſionary begged diſmiſſion from his poſt; which was granted, with thanks for his faithful ſervices. But the invaſion of the French, and the internal diviſions among the Hollanders themſelves, ſpread every where terror and confuſion; which the Orange party heightened, to ruin the De Wits. Cornelius, the penſionary's brother, was impriſoned and condemned to exile; and a report being raiſed that he would be reſcued, the mob armed, and ſurrounded the priſon where the two bro-

* See *Roſicrucians.*

thers then were together, dragged them out, barbarouſly murdered them, hung the bodies on the gallows, and cut them to pieces, which many of them even broiled, and ate with ſavage fury. Such was the end of one of the greateſt geniuſes of his age; of whom Sir William Temple, who was well acquainted with him, writes with the greateſt eſteem and admiration. He obſerves, that when he was at the head of the government, he differed nothing in his manner of living from an ordinary citizen. His office, for the firſt ten years, brought him in little more than 300 *l.* and in the latter part of his life, not above 700 *l.* per ann. He refuſed a gift of 10,000 *l.* from the States-General, becauſe he thought it a bad precedent in the government With great reaſon, therefore, Sir William Temple, ſpeaking of his death, obſerves, "He was a perſon that deſerved another fate, and a better return from his country; after 18 years ſpent in their miniſtry, without any care of his entertainments or eaſe, and little of his fortune. A man of unwearied induſtry, inflexible conſtancy, ſound, clear, and deep underſtanding, and untainted integrity; ſo that whenever he was blinded, it was by the paſſion he had for that which he eſteemed the good and intereſt of his ſtate. This teſtimony is juſtly due to him from all that were well acquainted with him; and is the more willingly paid, ſince there can be as little intereſt to flatter, as honour to reproach, the dead."

Beſides the works already mentioned, he wrote a book containing thoſe maxims of government, upon which he acted; which will be a never-fading monument to his immortal memory. A tranſlation of it from the original Dutch, entitled, *The true intereſt and political maxims of the republic of Holland*, has been printed in London; to the laſt edition of which, in 1746, are prefixed hiſtorical memoirs of the illuſtrious brothers Cornelius and John de Witt, by John Campbell, Eſq.

DEXTANS, in Roman antiquity, ten ounces, or $\frac{10}{12}$ of their libra. See LIBRA.

DEXTER, in heraldry, an appellation given to whatever belongs to the right ſide of a ſhield, or coat of arms: thus we ſay, *bend-dexter*, *dexter point*, &c.

DEXTROCHERE, or DESTROCHERE, in heraldry, is applied to the right arm painted in a ſhield, ſometimes naked; ſometimes clothed, or adorned with a bracelet; and ſometimes armed, or holding ſome moveable or member uſed in the arms.

DEY, in matters of government, the ſovereign prince of Algiers, anſwering to the BEY of Tunis.

DIABETES, in phyſic, an exceſſive diſcharge of urine, which comes away crude, and exceeds the quantity of liquids drank. See (the *Index* ſubjoined to) MEDICINE.

DIABOLUS. See DEVIL.

DIABOLUS *Marinus*. See RAIA.

DIABOLUS *Metellorum*, a title given by chemiſts to jupiter or tin, becauſe, when incorporated with other metals, it renders them incapable of reduction, or at leaſt very difficult to undergo that operation.

DIACAUSTIC CURVE, a ſpecies of the cauſtic curves formed by refraction.

DIACHYLON, in pharmacy, an emollient digeſtive plaſter, compoſed of mucilages or viſcid juices drawn from certain plants. See PHARMACY, n° 967.

DIACODIUM, in pharmacy, a ſyrup prepared from poppy-heads. It is alſo called the *ſyrupus de meconio*. See PHARMACY, n° 491.

DIACOUSTICS, called alſo DIAPHONICS, the conſideration of the properties of refracted ſound, as it paſſes through different mediums. See ACOUSTICS.

The word is formed from the Greek δια, *per*, "thro'," which intimates a paſſage; and ακȣω, *I hear*, q. d. the conſideration of the paſſage of the ſounds we hear. See SOUND.

DIADELPHIA, (δις, *twice*, and αδελφος a *brother*,) claſs the 17th in the ſexual ſyſtem, comprehending thoſe plants which bear hermaphrodite flowers with two ſets of united ſtamina, but this circumſtance muſt not be abſolutely depended on. They are the *papilionacei* of Tournefort, the *irregulares tetrapetali* of Rivinus, and the *leguminoſa* of Ray. See BOTANY, p. 1292. and Plate LIX.

DIADEM, in antiquity, a head-band, or fillet, worn by kings as a badge of their royalty. It was made of ſilk, thread, or wool, and tied round the temples and forehead, the ends being tied behind, and let fall on the neck. It was uſually white, and quite plain; though ſometimes embroidered with gold, and ſet with pearls and precious ſtones. In latter times, it came to be twiſted round crowns, laurels, &c. and even appears to have been worn on divers parts of the body. See CROWN.—The word comes from the Latin *diadema*; of the Greek διαδημα, *a little band encompaſſing the head*, of the verb διαδεω, *cingo*, "I gird."

DIADEM, in heraldry, is applied to certain circles, or rims, ſerving to incloſe the crowns of ſovereign princes, and to bear the globe and croſs, or the flower de luces for their creſt. The crowns of ſovereigns are bound, ſome with a greater, and ſome with a leſs number of diadems.—The bandage about the heads of Moors on ſhields is alſo called *diadem*, in blazoning.

DIÆRESIS, in ſurgery, an operation ſerving to divide and ſeparate the part when the continuity is a hindrance to the cure.

DIÆRESIS, in medicine, is the conſuming of the veſſels of an animal body, when from ſome corroding cauſe certain paſſages are made, which naturally ought not to have been; or certain natural paſſages are dilated beyond their ordinary dimenſions, ſo that the humours which ought to have been contained in the veſſels extravaſate or run out.

DIÆRESIS, in grammar, the diviſion of one ſyllable into two, which is uſually noted by two points over a letter, as *aulaï* inſtead of *aulæ*, *diſſolüenda* for *diſſolvenda*.

DIÆTETÆ, in Grecian antiquity, a kind of judges, of which there were two ſorts, the cleroti and diallacterii. The former were public arbitrators, choſen by lot to determine all cauſes exceeding ten drachms, within their own tribe, and from their ſentence an appeal lay to the ſuperior courts.

The diallacterii, on the contrary, were private arbitrators from whoſe ſentence there lay no appeal, and accordingly they always took an oath to adminiſter juſtice without partiality.

DIAGLYPHICE, the art of cutting or engraving figures on metals, ſuch as ſeals, intaglias, matrices of letters, &c. or coins for medals. See ENGRAVING.

DIAGNOSIS, (from διαγνωσκω, to *diſcern* or *diſtinguiſh*;

Diagnoſtic
||
Dial.

guiſh;) the diagnoſtics, or the ſigns of a diſeaſe. They are of two kinds, viz. the adjunct, and pathognomonic; the firſt are common to ſeveral diſeaſes, and ſerve only to point out the difference between diſeaſes of the ſame ſpecies; the latter are thoſe which always attend the diſeaſe, and diſtinguiſh it from all others.

DIAGNOSTIC, in medicine, a term given to thoſe ſigns which indicate the preſent ſtate of a diſeaſe, its nature and cauſe.

DIAGONAL, in geometry, a right line drawn acroſs a quadrilateral figure, from one angle to another, by ſome called the *diameter*, and by others the *diametral*, of the figure. See GEOMETRY.

DIAGORAS, ſurnamed the *atheiſt*, lived in the 91ſt Olympiad. He was not a native of Athens, but he philoſophiſed there. He delighted in making verſes, and had compoſed a poem which a certain poet ſtole from him. He ſued the thief, who ſwore it was his own, and got glory by it. This tempted Diagoras to deny a Providence. The Athenians ſummoned him to give an account of his doctrine. He fled, and they ſet a price upon his head, promiſing a reward to any who ſhould kill him; but he took ſhipping, and was caſt away.

DIAGRAM, in geometry, a ſcheme for explaining and demonſtrating the properties of any figure, whether triangle, ſquare, circle, &c. *

DIAGRAM, among ancient muſicians, the ſame with the ſcale of the moderns. See SCALE.

DIAHEXAPLA, or DIAHEXAPTE, among farriers, a compound medicine, ſo called from its containing ſix ingredients, *viz.* birthwort and gentian roots, juniper-berries, bay-berries, myrrh, and ivory ſhavings. It is commended for colds, conſumptions, purſineſs, and many other diſorders in horſes.

DIAL, or SUN-DIAL, an inſtrument ſerving to meaſure time, by means of the ſhadow of the ſun. The word is formed from the Latin *dies*, "day," becauſe indicating the *hour of the day*.

The ancients alſo called it *ſciathericum*, from its doing it by the ſhadow.

Definitions.

DIAL is more accurately defined, a plane, upon which lines are deſcribed in ſuch a manner, that the ſhadow of a wire, or of the upper edge of another plane, erected perpendicularly on the former, may ſhew the true time of the day.

The edge of the plane by which the time of the day is found, is called the *ſtile of the dial*, which muſt be parallel to the earth's axis; and the line on which the ſaid plane is erected, is called the *ſubſtile*.

The angle included between the ſubſtile and ſtile, is called the *elevation* or *height of the ſtile*.

Thoſe dials whoſe planes are parallel to the plane of the horizon, are called *horizontal dials*; and thoſe dials whoſe planes are perpendicular to the plane of the horizon, are called *vertical* or *erect dials*.

Thoſe erect dials, whoſe planes directly front the north or ſouth, are called *direct north* or *ſouth dials*; and all other erect dials are called *decliners*, becauſe their planes are turned away from the north or ſouth.

Thoſe dials whoſe planes are neither parallel nor perpendicular to the plane of the horizon, are called *inclining* or *reclining dials*, according as their planes make acute or obtuſe angles with the horizon; and if their planes are alſo turned aſide from facing the ſouth or north, they are called *declining-inclining* or *declining-reclining dials*.

Dial.

The interſection of the plane of the dial, with that of the meridian, paſſing through the ſtile, is called the *meridian of the dial*, or the *hour-line of XII*.

Thoſe meridians, whoſe planes paſs through the ſtile, and make angles of 15, 30, 45, 60, 75, and 90 degrees with the meridian of the place (which marks the hour-line of XII.) are called *hour-circles*; and their interſections with the plane of the dial are called *hour-lines*.

In all declining dials, the ſubſtile makes an angle with the hour-line of XII; and this angle is called the *diſtance of the ſubſtile from the meridian*.

The declining plane's difference of longitude, is the angle formed at the interſection of the ſtile and plane of the dial, by two meridians; one of which paſſes thro' the hour-line of XII, and the other through the ſubſtile.

Thus much being premiſed concerning dials in general, we ſhall now proceed to explain the different methods of their conſtruction.

Plate LXXXIX. fig. 1.
The univerſal principle on which dialing depends.

If the whole earth *aPcp*, were tranſparent, and hollow, like a ſphere of glaſs, and had its equator divided into 24 equal parts by ſo many meridian ſemicircles, *a*, *b*, *c*, *d*, *e*, *f*, *g*, &c. one of which is the geographical meridian of any given place, as London (which is ſuppoſed to be at the point *a*;) and if the hours of XII were marked at the equator, both upon that meridian and the oppoſite one, and all the reſt of the hours in order on the reſt of the meridians, thoſe meridians would be the hour-circles of London: then, if the ſphere had an opake axis, as *PEp*, terminating in the poles *P* and *p*, the ſhadow of the axis would fall upon every particular meridian and hour, when the ſun came to the plane of the oppoſite meridian, and would conſequently ſhew the time at London, and at all other places on the meridian of London.

Horizontal dial.

If this ſphere was cut through the middle by a ſolid plane *ABCD*, in the rational horizon of London, one half of the axis *E P* would be above the plane, and the other half below it; and if ſtraight lines were drawn from the centre of the plane, to thoſe points where its circumference is cut by the hour-circles of the ſphere, thoſe lines would be the hour-lines of a horizontal dial for London: for the ſhadow of the axis would fall upon each particular hour-line of the dial, when it fell upon the like hour-circle of the ſphere.

Fig. 2.
Vertical dial.

If the plane which cuts the ſphere be upright, as *AFCG*, touching the given place (London) at *F*, and directly facing the meridian of London, it will then become the plane of an erect direct ſouth-dial: and if right lines be drawn from its centre *E*, to thoſe points of its circumference where the hour-circles of the ſphere cut it, theſe will be the hour-lines of a vertical or direct ſouth-dial for London, to which the hours are to be ſet as in the figure (contrary to thoſe on a horizontal dial), and the lower half *E p* of the axis will caſt a ſhadow on the hour of the day in this dial, at the ſame time that it would fall upon the like hour-circle of the ſphere, if the dial plane was not in the way.

If the plane (ſtill facing the meridian) be made to incline, or recline, any given number of degrees, the hour-

* See Geometry.

Inclining, reclining, and declining, dials.

hour-circles of the ſphere will ſtill cut the edge of the plane in thoſe points to which the hour-lines muſt be drawn ſtraight from the centre; and the axis of the ſphere will caſt a ſhadow on theſe lines at the reſpective hours. The like will ſtill hold, if the plane be made to decline by any given number of degrees from the meridian toward the eaſt or weſt: provided the declination be leſs than 90 degrees, or the reclination be leſs than the co-latitude of the place: and the axis of the ſphere will be a gnomon, or ſtile, for the dial. But it cannot be a gnomon, when the declination is quite 90 degrees, nor when the reclination is equal to the co-latitude; becauſe, in theſe two caſes, the axis has no elevation above the plane of the dial.

And thus it appears, that the plane of every dial repreſents the plane of ſome great circle upon the earth; and the gnomon of the earth's axis, whether it be a ſmall wire as in the above figures, or the edge of a thin plate, as in the common horizontal dials.

The whole earth, as to its bulk, is but a point, if compared to its diſtance from the ſun: and therefore, if a ſmall ſphere of glaſs be placed upon any part of the earth's ſurface, ſo that its axis be parallel to the axis of the earth, and the ſphere have ſuch lines upon it, and ſuch planes within it, as above deſcribed; it will ſhew the hours of the day as truly as if it were placed at the earth's centre, and the ſhell of the earth were as tranſparent as glaſs.

Fig. 1, 2.

But becauſe it is impoſſible to have a hollow ſphere of glaſs perfectly true, blown round a ſolid plane; or if it was, we could not get at the plane within the glaſs to ſet it in any given poſition; we make uſe of a wire-ſphere to explain the principles of dialing, by joining 24 ſemi-circles together at the poles, and putting a thin flat plate of braſs within it.

Dialing by the common terreſtrial globe.

A common globe of 12 inches diameter, has generally 24 meridian ſemicircles drawn upon it. If ſuch a globe be elevated to the latitude of any given place, and turned about until one of theſe meridians cut the horizon in the north point, where the hour of XII is ſuppoſed to be marked, the reſt of the meridians will cut the horizon at the reſpective diſtances of all the other hours from XII. Then if theſe points of diſtance be marked on the horizon, and the globe be taken out of the horizon, and a flat board or plate be put into its place, even with the ſurface of the horizon; and if ſtraight lines be drawn from the centre of the board, to thoſe points of diſtance on the horizon which were cut by the 24 meridian ſemicircles; theſe lines will be the hour-lines of a horizontal dial for that latitude, the edge of whoſe gomon muſt be in the very ſame ſituation that the axis of the globe was, before it was taken out of the horizon: that is, the gnomon muſt make an angle with the plain of the dial, equal to the latitude of the place for which the dial is made.

If the pole of the globe be elevated to the co-latitude of the given place, and any meridian be brought to the north point of the horizon, the reſt of the meridians will cut the horizon in the reſpective diſtances of all the hours from XII, for a direct ſouth dial, whoſe gnomon muſt be an angle with the plane of the dial, equal to the co-latitude of the place; and the hours muſt be ſet the contrary way on this dial to what they are on the horizontal.

But if your globe have more than 24 meridian ſemicircles upon it, you muſt take the following method for making *horizontal* and *ſouth dials*.

To conſtruct a horizontal dial.

Elevate the pole to the latitude of your place, and turn the globe until any particular meridian (ſuppoſe the firſt) comes to the north point of the horizon, and the oppoſite meridian will cut the horizon in the ſouth. Then, ſet the hour-index to the uppermoſt XII on its circle; which done, turn the globe weſtward until 15 degrees of the equator paſs under the braſen meridian, and then the hour-index will be at I (for the ſun moves 15 degrees every hour), and the firſt meridian will cut the horizon in the number of degrees from the north point, that I is diſtant from XII. Turn on, until other 15 degrees of the equator paſs under the braſen meridian, and the hour-index will then be at II, and the firſt meridian will cut the horizon in the number of degrees that II is diſtant from XII: and ſo, by making 15 degrees of the equator paſs under the braſen meridian for every hour, the firſt meridian of the globe will cut the horizon in the diſtances of all the hours from XII to VI, which is juſt 90 degrees; and then you need go no farther, for the diſtances of XI, X, IX, VIII, VII, and VI, in the forenoon, are the ſame from XII, as the diſtances of I, II, III, IV, V, and VI, in the afternoon: and theſe hour-lines continued through the centre, will give the oppoſite hour lines on the other half of the dial.

Thus, to make a horizontal dial for the latitude of London, which is $51\frac{1}{2}$ degrees north, elevate the north pole of the globe $51\frac{1}{2}$ degrees above the north point of the horizon; and then turn the globe, until the firſt meridian (which is that of London on the Engliſh terreſtrial globe) cuts the north point of the horizon, and ſet the hour-index to XII at noon.

Then turning the globe weſtward until the index points ſucceſſively to I, II, III, IV, V, and VI, in the afternoon, or until 15, 30, 45, 60, 75, and 90 degrees of the equator paſs under the braſen meridian, you will find that the firſt meridian of the globe cuts the horizon in the following numbers of degrees from the north towards the eaſt, *viz.* $11\frac{2}{3}$, $24\frac{1}{4}$, $38\frac{1}{12}$, $53\frac{1}{2}$, $71\frac{1}{15}$, and 90; which are the reſpective diſtances of the above hours from XII upon the plane of the horizon.

Plate LXXXIX. fig. 3.

To transfer theſe, and the reſt of the hours, to a horizontal plane, draw the parallel right lines *a c* and *d b*, upon that plane, as far from each other as is equal to the intended thickneſs of the gnomon or ſtile of the dial, and the ſpace included between them will be the meridian or twelve o'clock line on the dial. Croſs this meridian at right angles with the ſix o'clock line *g h*, and ſetting one foot of your compaſſes in the interſection *a*, as a centre, deſcribe the quadrant *g e* with any convenient radius or opening of the compaſſes: then, ſetting one foot in the interſection *b*, as a centre, with the ſame radius deſcribe the quadrant *f h*, and divide each quadrant into 90 equal parts or degrees, as in the figure.

Becauſe the hour-lines are leſs diſtant from each other about noon, than in any other part of the dial, it is beſt to have the centres of theſe quadrants at a little diſtance from the centre of the dial-plane, on the ſide oppoſite to XII, in order to enlarge the hour-diſtances thereabouts, under the ſame angles on the plane. Thus, the centre of the plane is at *C*, but the centres of the quadrants are at *a* and *b*.

Plate LXXXIX.

Fig. 3.

Lay a ruler over the point *b* (and keeping it there for the centre of all the afternoon hours in the quadrant *f b*) draw the hour-line of I through $11\frac{2}{3}$ degrees in the quadrant; the hour-line of II, through $24\frac{1}{4}$ degrees; of III, through $38\frac{1}{12}$ degrees; IIII, through $53\frac{1}{2}$; and V, through $71\frac{1}{15}$: and becauſe the ſun riſes about four in the morning, on the longeſt days at London, continue the hour-lines of IV and V in the afternoon through the centre *b* to the oppoſite ſide of the dial.—This done, lay the ruler to the centre *a* of the quadrant *e g*; and through the like diviſions or degrees of that quadrant, *viz.* $11\frac{2}{3}$, $24\frac{1}{4}$, $38\frac{1}{12}$, $53\frac{1}{2}$, and $71\frac{1}{12}$, draw the forenoon hour-lines of XI, X, IX, VIII, and VII; and becauſe the ſun ſets not before eight in the evening on the longeſt days, continue the hour-lines of VII and VIII in the forenoon, through the centre *a*, to VII and VIII in the afternoon; and all the hour-lines will be finiſhed on this dial; to which the hours may be ſet, as in the figure.

Laſtly, through $51\frac{1}{2}$ degrees of either quadrant, and from its centre, draw the right line *a g* for the hypothenuſe or axis of the gnomon *a g i*; and from *g*, let fall the perpendicular *g i*, upon the meridian line *a i*, and there will be a triangle made, whoſe ſides are *a g*, *g i*, and *i a*. If a plate ſimilar to this triangle be made as thick as the diſtance between the lines *a c* and *b d*, and ſet upright between them, touching at *a* and *b*, its hypothenuſe *a g* will be parallel to the axis of the world, when the dial is truly ſet; and will caſt a ſhadow on the hour of the day.

N. B. The trouble of dividing the two quadrants may be ſaved, if you have a ſcale with a line of chords upon it, ſuch as that on the top of Plate XC.: for if you extend the compaſſes from 0 to 60 degrees of the line of chords, and with that extent, as a radius, deſcribe the two quadrants upon their reſpective centres, the above diſtances may be taken with the compaſſes upon the line, and ſet off upon the quadrants.

ig. 4.
n erect
outh dial.

To make an erect direct ſouth dial. Elevate the pole to the co-latitude of your place, and proceed in all reſpects as above taught for the horizontal dial, from VI in the morning to VI in the afternoon; only the hours muſt be reverſed, as in the figure; and the hypothenuſe *a g* of the gnomon *a g f*, muſt make an angle with the dial-plane equal to the co-latitude of the place. As the ſun can ſhine no longer on this dial than from ſix in the morning until ſix in the evening, there is no occaſion for having any more than 12 hours upon it.

Plate LXXXIX. fig. 3.

rect de-
lining
al.

To make an erect dial, declining from the ſouth towards the eaſt or weſt. Elevate the pole to the latitude of your place, and ſcrew the quadrant of altitude to the zenith. Then, if your dial declines towards the eaſt, (which we ſhall ſuppoſe it to do at preſent), count in the horizon the degrees of declination, from the eaſt point towards the north, and bring the lower end of the quadrant to that degree of declination at which the reckoning ends. This done, bring any particular meridian of your globe (as ſuppoſe the firſt meridian) directly under the graduated edge of the upper part of the brazen meridian, and ſet the hour to XII at noon. Then, keeping the quadrant of altitude at the degree of declination in the horizon, turn the globe eaſtward on its axis, and obſerve the degrees cut by the firſt meridian in the quadrant of altitude (counted from the zenith) as the hour-index comes to XI, X, IX, &c. in the forenoon, or as 15, 30, 45, &c. degrees of the equator paſs under the brazen meridian at theſe hours reſpectively; and the degrees then cut in the quadrant by the firſt meridian, are the reſpective diſtances of the forenoon hours from XII on the plane of the dial.—Then, for the afternoon hours, turn the quadrant of altitude round the zenith until it comes to the degree in the horizon oppoſite to that where it was placed before; namely, as far from the weſt point of the horizon towards the ſouth, as it was ſet at firſt from the eaſt point towards the north; and turn the globe weſtward on its axis, until the firſt meridian comes to the brazen meridian again, and the hour-index to XII: then, continue to turn the globe weſtward, and as the index points to the afternoon hours I, II, III, &c. or as 15, 30, 45, &c. degrees of the equator paſs under the brazen meridian, the firſt meridian will cut the quadrant of altitude in the reſpective number of degrees from the zenith that each of theſe hours is from XII on the dial.——And note, that when the firſt meridian goes off the quadrant at the horizon in the forenoon, the hour-index ſhews the time when the ſun will come upon this dial; and when it goes off the quadrant in the afternoon, the index will point to the time when the ſun goes off the dial.

Plate LXXXIX.

Having thus found all the hour-diſtances from XII, lay them down upon your dial-plane, either by dividing a ſemicircle into two quadrants of 90 degrees each (beginning at the hour-line of XII), or by the line of chords, as above directed.

In all declining dials, the line on which the ſtile or gnomon ſtands (commonly called the *ſubſtile-line*) makes an angle with the twelve o'clock line, and falls among the forenoon hour-lines, if the dial declines towards the eaſt; and among the afternoon hour-lines, when the dial declines towards the weſt; that is, to the left hand from the twelve o'clock line in the former caſe, and to the right hand from it in the latter.

To find the diſtance of the ſubſtile from the twelve o'clock line; if your dial declines from the ſouth toward the eaſt, count the degrees of that declination in the horizon from the eaſt point toward the north, and bring the lower end of the quadrant of altitude to that degree of declination where the reckoning ends: then, turn the globe until the firſt meridian cuts the horizon in the like number of degrees, counted from the ſouth point toward the eaſt; and the quadrant and firſt meridian will then croſs one another at right angles; and the number of degrees of the quadrant, which are intercepted between the firſt meridian and the zenith, is equal to the diſtance of the ſubſtile line from the twelve o'clock line; and the number of degrees of the firſt meridian, which are intercepted between the quadrant and the north pole, is equal to the elevation of the ſtile above the plane of the dial.

If the dial declines weſtward from the ſouth, count that declination from the eaſt point of the horizon towards the ſouth, and bring the quadrant of altitude to the degree in the horizon at which the reckoning ends; both for finding the forenoon hours, and diſtance of the ſubſtile from the meridian: and for the afternoon hours, bring the quadrant to the oppoſite degree in the horizon, namely, as far from the weſt towards the north, and then proceed in all reſpects as above.

Thus, we have finiſhed our declining dial; and in ſo doing, we made four dials, *viz.*

1. A north dial, declining eaſtward by the ſame number of degrees. 2. A north dial, declining the ſame number weſt. 3. A ſouth dial, declining eaſt. And, 4, A ſouth dial declining weſt. Only, placing the proper number of hours, and the ſtile or gnomon reſpectively, upon each plane. For (as above-mentioned) in the ſouth-weſt plane, the ſubſtilar-line falls among the afternoon hours; and in the ſouth-eaſt, of the ſame declination, among the forenoon hours, at equal diſtances from XII. And ſo all the morning hours on the weſt decliner will be like the afternoon hours on the eaſt decliner: the ſouth-eaſt decliner will produce the north-weſt decliner; and the ſouth-weſt decliner, the north-eaſt decliner, by only extending the hour-lines, ſtile and ſubſtile, quite through the centre: the axis of the ſtile (or edge that caſts the ſhadow on the hour of the day) being in all dials whatever parallel to the axis of the world, and conſequently pointing towards the north pole of the heaven in north latitudes, and toward the ſouth pole in ſouth latitudes.

An eaſy method for conſtructing of dials.

But becauſe every one who would like to make a dial, may perhaps not be provided with a globe to aſſiſt him, and may probably not underſtand the method of doing it by logarithmic calculation; we ſhall ſhew how to perform it by the plain dialing lines, or ſcale of latitudes and hours; ſuch as thoſe on the top of Plate XC. and which may be had on ſcales commonly ſold by the mathematical inſtrument makers.

This is the eaſieſt of all mechanical methods, and by much the beſt, when the lines are truly divided: and not only the half hours and quarters may be laid down by all of them, but every fifth minute by moſt, and every ſingle minute by thoſe where the line of hours is a foot in length.

Fig 5.

Having drawn your double meridian line *a b*, *c d*, on the plane intended for a horizontal dial, and croſſed it at right angles by the ſix o'clock line *f e* (as in fig. 3.) take the latitude of your place with the compaſſes, in the ſcale of latitudes, and ſet that extent from *c* to *e*, and from *a* to *f*, on the ſix o'clock line: then, taking the whole ſix hours between the points of the compaſſes in the ſcale of hours, with that extent ſet one foot in the point *c*, and let the other foot fall where it will upon the meridian line *c d*, as at *d*. Do the ſame from *f* to *b*, and draw the right lines *e d* and *f b*, each of which will be equal in length to the whole ſcale of hours. This done, ſetting one foot of the compaſſes in the beginning of the ſcale at XII, and extending the other to each hour on the ſcale, lay off theſe extents from *d* to *e* for the afternoon hours, and from *b* to *f* for thoſe of the forenoon: this will divide the lines *d e* and *b f* in the ſame manner as the hour-ſcale is divided at 1, 2, 3, 4, and 6; on which the quarters may alſo be laid down, if required. Then, laying a ruler on the point *c*, draw the firſt five hours in the afternoon, from that point, through the dots at the numeral figures 1, 2, 3, 4, 5, on the line *d e*; and continue the lines of IIII and V through the centre *c* to the other ſide of the dial, for the like hours of the morning: which done, lay the ruler on the point *a*, and draw the laſt five hours in the forenoon through the dots 5, 4, 3, 2, 1, on the line *f b*; continuing the hour-lines of VII and VIII through the centre *a* to the other ſide of the dial, for the like hours of the evening; and ſet the hours to their reſpective lines, as in the figure. Laſtly, make the gnomon the ſame way as taught above for the horizontal dial, and the whole will be finiſhed.

To make an erect ſouth-dial, take the co-latitude of your place from the ſcale of latitudes, and then proceed in all reſpects for the hour-lines, as in the horizontal dial; only reverſing the hours, as in fig. 4. and making the angle of the ſtile's height equal to the co-latitude.

But, leſt the young dialiſt ſhould have neither globe nor wooden ſcale, we ſhall now ſhew him how he may make a dial without any of theſe helps. Only, if he has not a line of chords, he muſt divide a quadrant into 90 equal parts or degrees for taking the proper angle of the ſtile's elevation; which is eaſily done.

Fig. 6.

Horizontal dial.

With any opening of the compaſſes, as *Z L*, deſcribe the two ſemicircles *L F k* and *L Q k*, upon the centres *Z* and *z*, where the ſix o'clock line croſſes the double meridian line, and divide each ſemicircle into 12 equal parts, beginning at *L*, (though, ſtrictly ſpeaking, only the quadrants from *L* to the ſix o'clock line need be divided;) then connect the diviſions which are equidiſtant from *L*, by the parallel lines *KM*, *IN*, *HO*, *GP*, and *FQ*. Draw *VZ* for the hypothenuſe of the ſtile, making the angle *VZE* equal to the latitude of your place; and continue the line *VZ* to *R*. Draw the line *Rr* parallel to the ſix o'clock line, and ſet off the diſtance *a K* from Z to *Y*, the diſtance *b I* from Z to *X*, *c H* from Z to *W*, *d G* from Z to *T*, and *e F* from Z to *S*. Then draw the lines *Ss*, *Tt*, *Ww*, *Xx*, and *Yy*, each parallel to *Rr*. Set off the diſtance *yY* from *a* to 11, and from *f* to 1; the diſtance *xX* from *b* to 10, and from *g* to 2; *wW* from *c* to 9, and from *h* to 3; *tT* from *d* to 8, and from *i* to 4; *sS* from *e* to 7, and from *n* to 5. Then laying a ruler to the centre Z, draw the forenoon hour-lines through the points 11, 10, 9, 8, 7; and laying it to the centre *z*, draw the afternoon lines through the points 1, 2, 3, 4, 5; continuing the forenoon lines of VII and VIII through the centre Z, to the oppoſite ſide of the dial, for the like afternoon hours; and the afternoon lines IIII and V through the centre *z*, to the oppoſite ſide, for the like morning hours. Set the hours to theſe lines as in the figure, and then erect the ſtile or gnomon, and the horizontal dial will be finiſhed.

To conſtruct a ſouth dial, draw the line *VZ*, making an angle with the meridian Z L equal to the co-latitude of your place; and proceed in all reſpects as in the above horizontal dial for the ſame latitude, reverſing the hours as in fig. 4. and making the elevation of the gnomon equal to the co-latitude.

Perhaps it may not be unacceptable to explain the method of conſtructing the dialing lines, and ſome others; which is as follows.

Dialing lines, how conſtructed.

Plate XC.

With any opening of the compaſſes, as *E A*, according to the intended length of the ſcale, deſcribe the circle *A D C B*, and croſs it at right angles by the diameters *C E A* and *D E B*. Divide the quadrant *A B* firſt into 9 equal parts, and then each part into 10; ſo ſhall the quadrant be divided into 90 equal parts or degrees. Draw the right line *A F B* for the chord of this quadrant; and ſetting one foot of the compaſſes in the point *A*, extend the other to the ſeveral diviſions of the quadrant, and tranſfer theſe

Fig. 1:

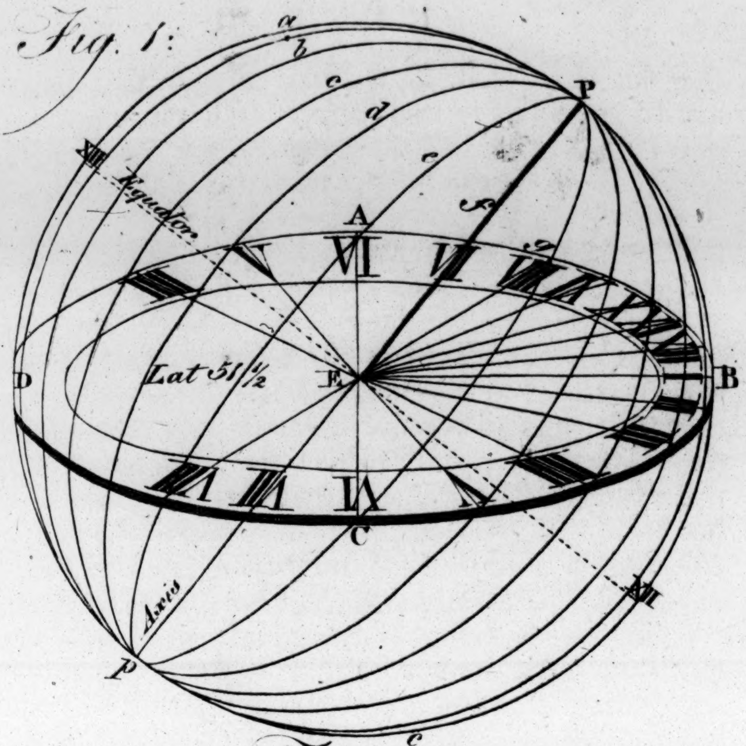
a
b
c
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Fig. 2.

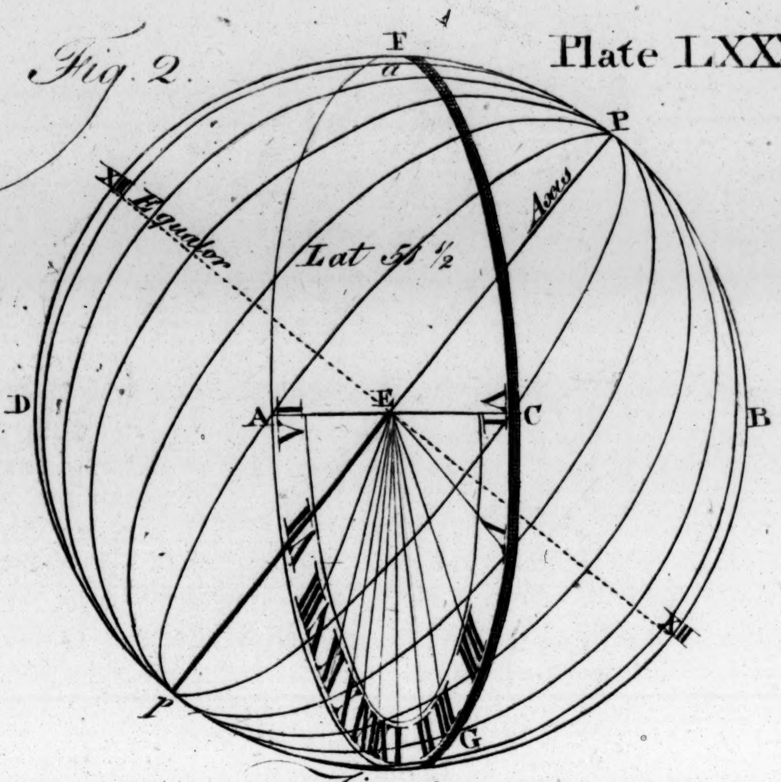
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Fig. 3.

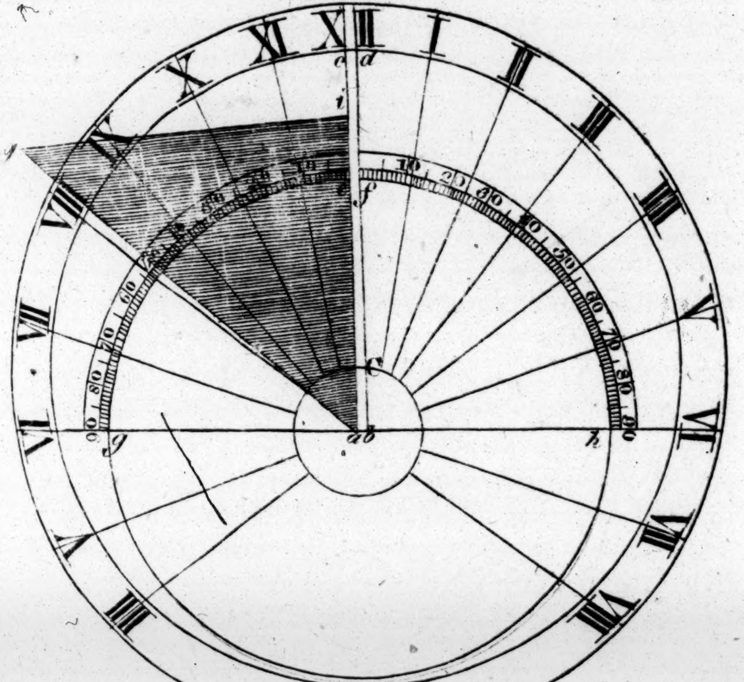
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Fig. 4.

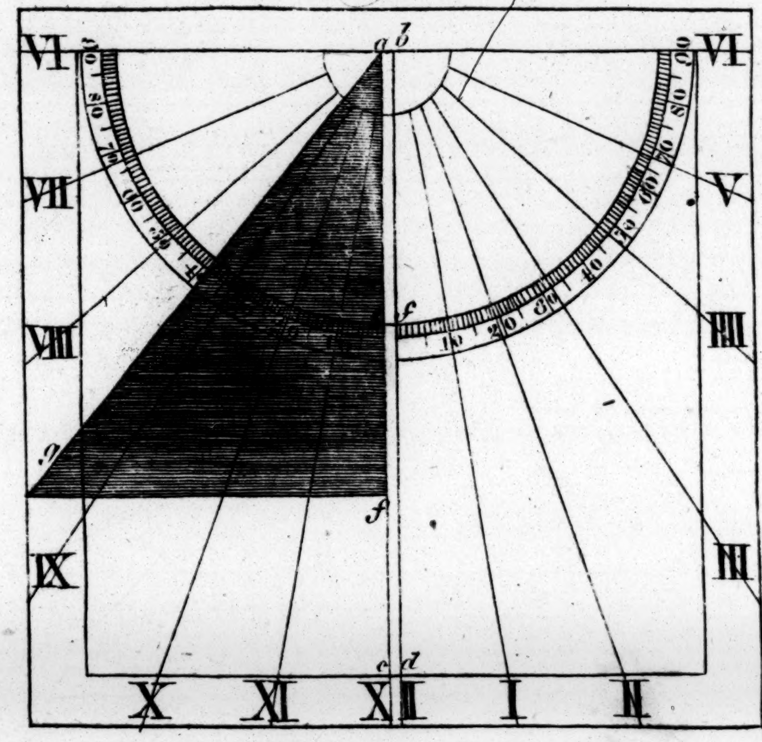
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Fig. 5

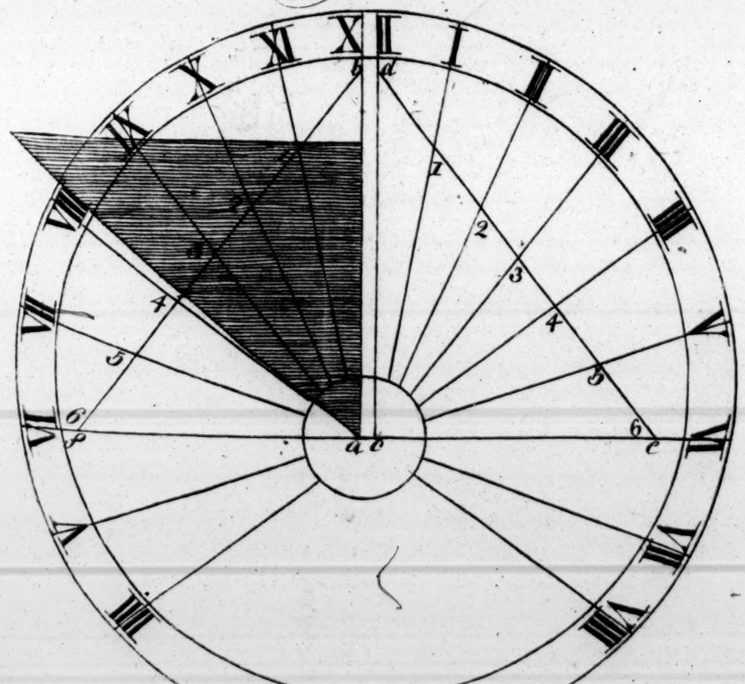
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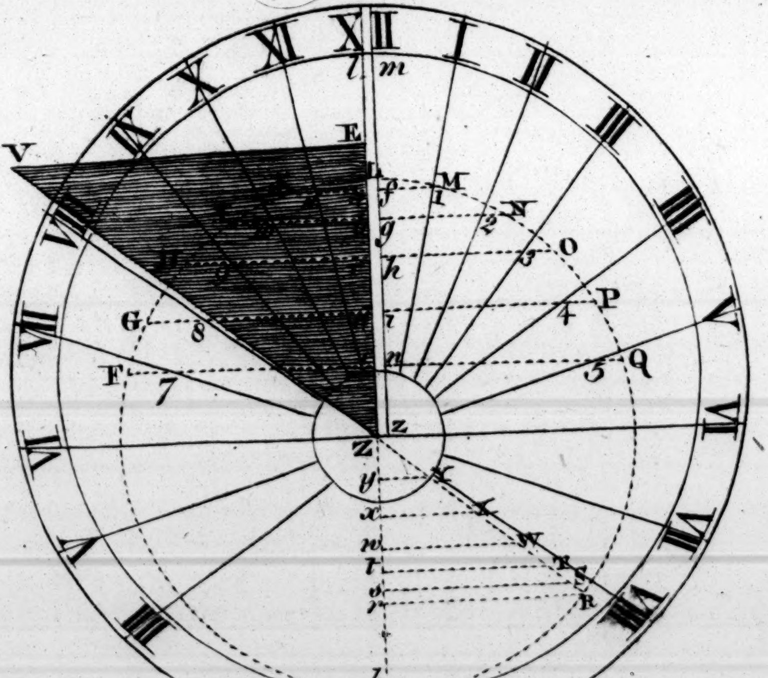
Fig. 6.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12

Dial.

Plate XC.

theſe diviſions to the line *AFB* by the arcs 10, 10, 20, 20, &c. and this will be a line of chords, divided into 90 unequal parts; which, if transferred from the line back again to the quadrant, will divide it equally. It is plain by the figure, that the diſtance from *A* to 60 in the line of chords, is juſt equal to *AE*, the radius of the circle from which that line is made; for if the arc 60, 60 be continued, of which *A* is the centre, it goes exactly through the centre *E* of the arc *AB*.

And therefore, in laying down any number of degrees on a circle, by the line of chords, you muſt firſt open the compaſſes ſo, as to take in juſt 60 degrees upon that line, as from *A* to 60: and then, with that extent, as a radius, deſcribe a circle, which will be exactly of the ſame ſize with that from which the line was divided: which done, ſet one foot of the compaſſes in the beginning of the chord line, as at *A*, and extend the other to the number of degrees you want upon the line; which extent, applied to the circle, will include the like number of degrees upon it.

Divide the quadrant *CD* into 90 equal parts, and from each point of diviſion draw right lines, as *i*, *k*, *l*, &c. to the line *CE*; all perpendicular to that line, and parallel to *DE*, which will divide *EC* into a line of ſines; and although theſe are ſeldom put among the dialing lines on a ſcale, yet they aſſiſt in drawing the line of latitudes. For if a ruler be laid upon the point *D*, and over each diviſion in the line of ſines, it will divide the quadrant *CB* into 90 unequal parts, as *Ba*, *Bb*, &c. ſhewn by the right lines 10*a*, 20*b*, 30*c*, &c. drawn along the edge of the ruler. If the right line *BC* be drawn, ſubtending this quadrant, and the neareſt diſtances *Ba*, *Bb*, *Bc*, &c. be taken in the compaſſes from *B*, and ſet upon this line in the ſame manner as directed for the line of chords, it will make a line of latitudes *BC*, equal in length to the line of chords *AB*, and of an equal number of diviſions, but very unequal as to their lengths.

Draw the right line *DGA*, ſubtending the quadrant *DA*; and parallel to it, draw the right line *rs*, touching the quadrant *DA* at the numeral figure 3. Divide this quadrant into ſix equal parts, as 1, 2, 3, &c. and through theſe points of diviſion draw right lines from the centre *E* to the line *rs*, which will divide it at the points where the ſix hours are to be placed, as in the figure. If every ſixth part of the quadrant be ſubdivided into four equal parts, right lines drawn from the centre through theſe points of diviſion, and continued to the line *rs*, will divide each hour upon it into quarters.

ial on a

In Fig. 2. we have the repreſentation of a portable dial, which may be eaſily drawn on a card, and carried in a pocket-book. The lines *ad*, *ab*, and *bc* of the gnomon, muſt be cut quite through the card; and as the end *ab* of the gnomon is raiſed occaſionally above the plane of the dial, it turns upon the uncut line *cd* as on a hinge. The dotted line *AB* muſt be ſlit quite through the card, and the thread *C* muſt be put through the ſlit, and have a knot tied behind, to keep it from being eaſily drawn out. On the other end of this thread is a ſmall plummet *D*, and on the middle of it a ſmall bead for ſhewing the hour of the day.

To rectify this dial, ſet the thread in the ſlit right againſt the day of the month, and ſtretch the thread from the day of the month over the angular point where the curve-lines meet at XII; then ſhift the bead to that point on the thread, and the dial will be rectified.

Dial.

Plate XC.

To find the hour of the day, raiſe the gnomon (no matter how much or how little) and hold the edge of the dial next the gnomon towards the ſun, ſo as the uppermoſt edge of the ſhadow of the gnomon may juſt cover the *ſhadow-line*; and the bead then playing freely on the face of the dial, by the weight of the plummet, will ſhew the time of the day among the hour-lines, as it is forenoon or afternoon.

To find the time of ſun-riſing and ſetting, move the thread among the hour-lines, until it either covers ſome one of them, or lies parallel betwixt any two; and then it will cut the time of ſun-riſing among the forenoon hours, and of ſun-ſetting among the afternoon hours, for that day of the year to which the thread is ſet in the ſcale of months.

To find the ſun's declination, ſtretch the thread from the day of the month over the angular point at XII, and it will cut the ſun's declination, as it is north or ſouth, for that day, in the proper ſcale.

To find on what days the ſun enters the ſigns: when the bead, as above rectified, moves along any of the curve-lines which have the ſigns of the zodiac marked upon them, the ſun enters thoſe ſigns on the days pointed out by the thread in the ſcale of months.

The conſtruction of this dial is very eaſy, eſpecially if the reader compares it all along with fig. 3. as he reads the following explanation of that figure.

Fig. 3.

Draw the occult line *AB* parallel to the top of the card, and croſs it at right angles with the ſix o'clock line *ECD*; then upon *C*, as a centre, with the radius *CA*, deſcribe the ſemicircle *AEL*, and divide it into 12 equal parts (beginning at *A*), as *Ar*, *As*, &c. and from theſe points of diviſion draw the hour-lines *r*, *s*, *t*, *u*, *v*, *E*, *w*, and *x*, all parallel to the ſix o'clock line *EC*. If each part of the ſemicircle be ſubdivided into four equal parts, they will give the half-hour lines and quarters, as in fig. 2. Draw the right-line *ASDo*, making the angle *SAB* equal to the latitude of your place. Upon the centre *A* deſcribe the arch *RST*, and ſet off upon it the arcs *SR* and *ST*, each equal to 23½ degrees, for the ſun's greateſt declination; and divide them into 23½ equal parts, as in fig. 2. Through the interſection *D* of the lines *ECD* and *ADo*, draw the right line *FDG* at right angles to *ADo*. Lay a ruler to the points *A* and *R*, and draw the line *ARF* through 23½ degrees of ſouth declination in the arc *SR*; and then laying the ruler to the points *A* and *T*, draw the line *ATG* through 23½ degrees of north declination in the arc *ST*: ſo ſhall the lines *ARF* and *ATG* cut the line *FDG* in the proper length for the ſcale of months. Upon the centre *D*, with the radius *DF*, deſcribe the ſemicircle *FoG*; which divide into ſix equal parts, *Fm*, *mn*, *no*, &c. and from theſe points of diviſion draw the right lines *mh*, *ni*, *pk*, and *ql*, each parallel to *oD*. Then ſetting one foot of the compaſſes in the point *F*, extend the other to *A*, and deſcribe the arc *AZH* for the tropic of ♑: with the ſame extent, ſetting one foot in *G*, deſcribe the arc *AEO* for the tropic of ♋. Next ſetting one foot in the point *h*, and extending the other to *A*, deſcribe the arc *ACI* for the beginnings of the ſigns ♒ and ♐; and with the ſame extent, ſetting one foot in the point

h,

Plate XC.

l, deſcribe the arc *AN* for the beginnings of the ſigns ♊ and ♌. Set one foot in the point *i*, and having extended the other to *A*, deſcribe the arc *AK* for the beginnings of the ſigns ♓ and ♏; and with the ſame extent, ſet one foot in *k*, and deſcribe the arc *AM* for the beginnings of the ſigns ♉ and ♍. Then ſetting one foot in the point *D*, and extending the other to *A*, deſcribe the curve *AL* for the beginnings of ♈ and ♎; and the ſigns will be finiſhed. This done, lay a ruler from the point *A* over the ſun's declination in the arch *RST*; and where the ruler cuts the line *FDG*, make marks; and place the days of the months right againſt theſe marks, in the manner ſhewn by fig. 2. Laſtly, draw the ſhadow-line *PQ* parallel to the occult line *AB*; make the gnomon, and ſet the hours to their reſpective lines, as in fig. 2. and the dial will be finiſhed.

An univerſal dial.

Fig 4.

There are ſeveral kinds of dials, which are called *univerſal*, becauſe they ſerve for all latitudes. Of theſe, the beſt is Mr Pardie's, which conſiſts of three principal parts; the firſt whereof is called the horizontal plane *(A)*, becauſe in practice it muſt be parallel to the horizon. In this plane is fixed an upright pin, which enters into the edge of the ſecond part *BD*, called the meridional plane; which is made of two pieces, the loweſt whereof *(B)* is called the *quadrant*, becauſe it contains a quarter of a circle, divided into 90 degrees; and it is only into this part, near *B*, that the pin enters. The other piece is a ſemicircle *(D)* adjuſted to the quadrant, and turning in it by a groove, for raiſing or depreſſing the diameter (*EF*) of the ſemicircle, which diameter is called the *axis of the inſtrument*. The third piece is a circle (*G*), divided on both ſides into 24 equal parts, which are the hours. This circle is put upon the meridional plane ſo, that the axis *(EF)* may be perpendicular to the circle, and the point *C* be the common centre of the circle, ſemicircle, and quadrant. The ſtraight edge of the ſemicircle is chamfered on both ſides to a ſharp edge, which paſſes through the centre of the circle. On one ſide of the chamfered part, the firſt ſix months of the year are laid down, according to the ſun's declination for their reſpective days, and on the other ſide the laſt ſix months. And againſt the days on which the ſun enters the ſigns, there are ſtraight lines drawn upon the ſemicircle, with the characters of the ſigns marked upon them. There is a black line drawn along the middle of the upright edge of the quadrant, over which hangs a thread *(H)*, with its plummet *(I)*, for levelling the inſtrument. *N. B.* From the twenty-third of September to the twentieth of March, the upper ſurface of the circle muſt touch both the centre *C* of the ſemicircle, and the line of ♈ and ♎; and from the twentieth of March to the twenty-third of September, the lower ſurface of the circle muſt touch that centre and line.

To find the time of the day by this dial. Having ſet it on a level place in ſun-ſhine, and adjuſted it by the levelling ſcrews *k* and *l*, until the plumb-line hangs over the black line upon the edge of the quadrant, and parallel to the ſaid edge; move the ſemicircle in the quadrant, until the line of ♈ and ♎ (where the circle touches) comes to the latitude of your place in the quadrant: then turn the whole meridional plane *BD*, with its circle *G*, upon the horizontal plane *A*, until the edge of the ſhadow of the circle falls preciſely on the day of the month in the ſemicircle; and then the meridional plane will be due north and ſouth, the axis *EF* will be parallel to the axis of the world, and will caſt a ſhadow upon the true time of the day, among the hours on the circle.

N. B. As, when the inſtrument is thus rectified, the quadrant and ſemicircle are in the plane of the meridian, ſo the circle is then in the plane of the equinoctial. Therefore, as the ſun is above the equinoctial in ſummer (in northern latitudes), and below it in winter; the axis of the ſemicircle will caſt a ſhadow on the hour of the day, on the upper ſurface of the circle, from the 20th of March to the 23d of September: and from the 23d of September to the 20th of March the hour of the day will be determined by the ſhadow of the ſemicircle, upon the lower ſurface of the circle. In the former caſe, the ſhadow of the circle falls upon the day of the month, on the lower part of the diameter of the ſemicircle; and in the latter caſe, on the upper part.

Fig. 5.

The method of laying down the months and ſigns upon the ſemicircle is as follows. Draw the right-line *ACB*, equal to the diameter of the ſemicircle *ADB*, and croſs it in the middle at right angles with the line *ECD*, equal in length to *ADB*; then *EC* will be the radius of the circle *FCG*, which is the ſame as that of the ſemicircle. Upon *E*, as a centre, deſcribe the circle, *FCG*, on which ſet off the arcs *Ch* and *Ci*, each equal to 23½ degrees, and divide them accordingly into that number, for the ſun's declination. Then laying the edge of a ruler over the centre *E*, and alſo over the ſun's declination for every fifth day of each month (as in the card-dial) mark the points on the diameter *AB* of the ſemicircle from *a* to *g*, which are cut by the ruler; and *there* place the days of the months accordingly, anſwering to the ſun's declination. This done, ſetting one foot of the compaſſes in *C*, and extending the other to *a* or *g*, deſcribe the ſemicircle *a b c d e f g*; which divide into ſix equal parts, and through the points of diviſion draw right lines, parallel to *C D*, for the beginning of the ſines (of which one half are on one ſide of the ſemicircle, and the other half on the other), and ſet the characters of the ſigns to their proper lines, as in the figure.

Having ſhewn how to make ſun-dials by the aſſiſtance of a good globe, or of a dialing ſcale, we ſhall now proceed to the method of conſtructing dials arithmetically; which will be more agreeable to thoſe who have learned the elements of trigonometry, becauſe globes and ſcales can never be ſo accurate as the logarithms in finding the angular diſtances of the hours. Yet, as a globe may be found exact an enough for ſome other requiſites in dialing, we ſhall take it in occaſionally.

The conſtruction of ſun-dials on all planes whatever, may be included in one general rule: intelligible, if that of a horizontal dial for any given latitude be well underſtood. For there is no plane, however obliquely ſituated with reſpect to any given place, but what is parallel to the horizon of ſome other place; and therefore, if we can find that other place by a problem on the terreſtrial globe, or by a trigonometrical calculation, and conſtruct a horizontal dial for it; that dial applied to the plane where it is to ſerve, will be a true dial for that place.——Thus, an erect direct ſouth dial in

51½ degrees north-latitude, would be a horizontal dial on the ſame meridian, 90 degrees ſouthward of 51½ degrees north-latitude: which falls in with 38½ degrees of ſouth latitude. But if the upright plane declines from facing the ſouth at the given place, it would ſtill be a horizontal plane 90 degrees from that place, but for a different longitude, which would alter the reckoning of the hours accordingly.

CASE I.

1. Let us ſuppoſe, that an upright plane at London declines 36 degrees weſtward from facing the ſouth; and that it is required to find a place on the globe, to whoſe horizon the ſaid plane is parallel; and alſo the difference of longitude between London and that place.

Rectify the globe to the latitude of London, and bring London to the zenith under the braſs meridian; then that point of the globe which lies in the horizon at the given degree of declination (counted weſtward from the ſouth point of the horizon) is the place at which the abovementioned plane would be horizontal. ——Now, to find the latitude and longitude of that place, keep your eye upon the place, and turn the globe eaſtward, until it comes under the graduated edge of the braſs meridian: then, the degree of the braſs meridian that ſtands directly over the place, is its latitude; and the number of degrees in the equator, which are intercepted between the meridian of London and the braſs meridian, is the place's difference of longitude.

Thus, as the latitude of London is 51½ degrees north, and the declination of the place is 36 degrees weſt; elevate the north pole 51½ degrees above the horizon, and turn the globe until London comes to the zenith, or under the graduated edge of the meridian; then count 36 degrees on the horizon weſtward from the ſouth point, and make a mark on that place of the globe over which the reckoning ends, and bringing the mark under the graduated edge of the braſs meridian, it will be found to be under 30¼ degrees in ſouth latitude: keeping it there, count in the equator the number of degrees between the meridian of London and the braſen meridian (which now becomes the meridian of the required place) and you will find it to be 42¾. Therefore an upright plane at London, declining 36 degrees weſtward from the ſouth, would be a horizontal plane at that place, whoſe latitude is 30¼ degrees ſouth of the equator, and longitude 42¾ degrees weſt of the meridian of London.

Which difference of longitude being converted into time, is 2 hours 51 minutes.

The vertical dial declining weſtward 36 degrees at London, is therefore to be drawn in all reſpects as a horizontal dial for ſouth latitude 30¼ degrees; ſave only, that the reckoning of the hours is to anticipate the reckoning on the horizontal dial, by 2 hours 51 minutes: for ſo much ſooner will the ſun come to the meridian of London, than to the meridian of any place whoſe longitude is 42¾ degrees weſt from London.

2. But to be more exact than the globe will ſhew us, we ſhall uſe a little trigonometry.

Let *NESW* be the horizon of London, whoſe zenith is Z, and *P* the north pole of the ſphere; and let Z *h* be the poſition of a vertical plane at Z, declining weſtward from *S* (the ſouth) by an angle of 36 degrees; on which plane an erect dial for London at Z is to be deſcribed. Make the ſemidiameter *ZD* perpendicular to *Zh;* and it will cut the horizon in *D*, 36 degrees weſt of the ſouth *S*. Then a plane, in the tangent *HD*, touching the ſphere in *D*, will be parallel to the plane *Zh;* and the axis of the ſphere will be equally inclined to both theſe planes.

Let *WQE* be the equinoctial, whoſe elevation above the horizon of Z (London) is 38½ degrees; and *PRD* be the meridian of the place *D*, cutting the equinoctial in *R*. Then it is evident, that the arc *RD* is the latitude of the place *D* (where the plane *Zh* would be horizontal) and the arc *RQ* is the difference of longitude of the planes *Zh* and *DH*.

In the ſpherical triangle *WDR*, the arc *WD* is given, for it is the complement of the plane's declination from *S* to ſouth; which complement is 54° (viz. 90°—36°:) the angle at *R*, in which the meridian of the place *D* cuts the equator, is a right angle; and the angle *RWD* meaſures the elevation of the equinoctial above the horizon of *Z*, namely, 38½ degrees. Say therefore, As radius is to the co-ſine of the plane's declination from the ſouth, ſo is the co-ſine of the latitude of Z to the ſine of RD the latitude of D: which is of a different denomination from the latitude of Z, becauſe Z and D are on different ſides of the equator.

As radius - - - - - 10.00000
To co-ſine 36° 0′ = *RQ* 9.90796
So co-ſine 51° 30′ = *Q*Z 9.79415

To ſine 30° 14′ = DR (9.70211) = the lat. of D, whoſe horizon is parallel to the vertical plane *Z h* at Z.

N. B. When radius is made the firſt term, it may be omitted; and then by ſubtracting it mentally from the ſum of the other two, the operation will be ſhortened. Thus, in the preſent caſe,

To the logarithmic ſine of *WR*=* 54° 0′ 9.90796.
Add the logarithmic ſine of *RD*=† 38° 30′ 9.79415.

Their ſum—radius - - - - - - - - 9.70211
gives the ſame ſolution as above. And we ſhall keep to this method in the following part of this article.

To find the difference of longitude of the places D and Z, ſay, As radius is to the co-ſine of 38½ degrees, the height of the equinoctial at Z, ſo is the co-tangent of 36 degrees, the plane's declination, to the co-tangent of the difference of longitudes. Thus,

To the logarithmic ſine of * 51° 30′ 9.89354
Add the logarithmic tang. of † 54° 0′ 10.13874

Their ſum—radius - - - - - - 10.03228
is the neareſt tangent of 47° 8′ = *WR;* which is the co-tangent of 42° 52′ = *RQ*, the difference of longitude ſought. Which difference, being reduced to time, is two hours 51½ minutes.

3. And thus having found the exact latitude and longitude of the place D, to whoſe horizon the vertical plane at Z is parallel, we ſhall proceed to the conſtruction of a horizontal dial for the place D, whoſe latitude is 30° 14′ ſouth; but anticipating the time at D by two hours 51 minutes (neglecting the ½ min. in practice) becauſe

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* The co-ſine of 36. 0. or of *RQ*. † The co-ſine of 51. 30. or of *QZ*. * The co-ſine of 38. 30. or of *WDR*.
† The co-tangent of 36. 0. or of *DW*.

Plate XC.

because D is ſo far weſtward in longitude from the meridian of London; and this will be a true vertical dial at London, declining weſtward 36 degrees.

Fig. 7.

Aſſume any right line CSL, for the ſubſtile of the dial, and make the angle KCP equal to the latitude of the place (viz. 30° 14′.) to whoſe horizon the plane of the dial is parallel; then CRP will be the axis of the ſtile, or edge that caſts the ſhadow on the hours of the day, in the dial. This done, draw the contingent line EQ, cutting the ſubſtilar line at right angles in K; and from K make KR perpendicular to the axis CRP. Then KG ($=KR$) being made radius, that is, equal to the chord of 60° or tangent of 45° on a good ſector, take 42° 52′ (the difference of longitude of the places Z and D) from the tangents, and having ſet it from K to M, draw CM for the hour-line of XII. Take KN, equal to the tangent of an angle leſs by 15 degrees than KM; that is, the tangent of 27° 52′: and through the point N draw CN for the hour-line of I. The tangent of 12° 52′ (which is 15° leſs than 27° 52′), ſet off the ſame way, will give a point between K and N, through which the hour-line of II is to be drawn. The tangent of 2° 8′ (the difference between 45° and 42° 52′) placed on the other ſide of CL, will determine the point through which the hour-line of III is to be drawn: to which 2° 8′, if the tangent of 15° be added, it will make 17° 8′; and this ſet off from K towards Q on the line EQ, will give the point for the hour-line of IV: and ſo of the reſt.—The forenoon hour-lines are drawn the ſame way, by the continual addition of the tangents 15°, 30°, 45°, &c. to 42° 52′ (=the tangent of KM) for the hours of XI, X, IX, &c. as far as neceſſary; that is, until there be five hours on each ſide of the ſubſtile. The ſixth hour, accounted from that hour or part of the hour on which the ſubſtile falls, will be always in a line perpendicular to the ſubſtile, and drawn through the centre C.

4. In all erect dials, CM, the hour-line of XII, is perpendicular to the horizon of the place for which the dial is to ſerve; for that line is the interſection of a vertical plane with the plane of the meridian of the place, both which are perpendicular to the plane of the horizon: and any line HO, or ho, perpendicular to CM, will be a horizontal line on the plane of the dial, along which line the hours may be numbered; and CM being ſet perpendicular to the horizon, the dial will have its true poſition.

5. If the plane of the dial had declined by an equal angle toward the eaſt, its deſcription would have differed only in this, that the hour-line of XII would have fallen on the other ſide of the ſubſtile CL, and the line HO would have a ſubcontrary poſition to what it has in this figure.

6. And theſe two dials, with the upper points of their ſtiles turned toward the north pole, will ſerve for other two planes parallel to them; the one declining from the north toward the eaſt, and the other from the north toward the weſt, by the ſame quantity of angle. The like holds true of all dials in general, whatever be their declination and obliquity of their planes to the horizon.

Plate XCI.

CASE II.

7. If the plane of the dial not only *declines*, but alſo *reclines*, or *inclines*. Suppoſe its declination from fronting the ſouth S be equal to the arc SD on the horizon; and its reclination be equal to the arc Dd of the vertical circle DZ: then it is plain, that if the quadrant of altitude ZdD on the globe cuts the point D in the horizon, and the reclination is counted upon the quadrant from D to d; the interſection of the hour circle PRd, with the equinoctial WQE, will determine Rd, the latitude of the place d, whoſe horizon is parallel to the given plane Zh at Z; and RQ will be the difference in longitude of the places at d and Z.

Fig. 1.

Trigonometrically thus: let a great circle paſs thro' the three points W, d, E; and in the triangle WDd, right-angled at D, the ſides WD and Dd are given; and thence the angle DWd is found, and ſo is the hypothenuſe Wd. Again, the difference, or the ſum, of DWd and DWR, the elevation of the equinoctial above the horizon of Z, gives the angle dWR; and the hypothenuſe of the triangle WRd was juſt now found; whence the ſides Rd and WR are found, the former being the latitude of the place d, and the latter the complement of RQ, the difference of longitude ſought.

Thus, if the latitude of the place Z be 52° 10′ north; the declination SD of the plane Zh (which would be horizontal at d) be 36°, and the reclination be 15°, or equal to the arc Dd; the ſouth latitude of the place d, that is, the arc Rd, will be 15° 9′; and RQ, the difference of the longitude, 36° 2′. From theſe data, therefore, let the dial (fig. 2.) be deſcribed, as in the former example.

8. There are ſeveral other things requiſite in the practice of dialing; the chief of which ſhall be given in the form of arithmetical rules, ſimple and eaſy to thoſe who have learned the elements of trigonometry. For in practical arts of this kind, arithmetic ſhould be uſed as far as it can go; and ſcales never truſted to, except in the final conſtruction, where they are abſolutely neceſſary in laying down the calculated hour-diſtances on the plane of the dial.

Rule I. *To find the angles which the hour-lines on any dial make with the ſubſtile.*

To the logarithmic ſine of the given latitude, or of the ſtile's elevation above the plane of the dial, add the logarithmic tangent of the hour * diſtance from the meridian, or from the † ſubſtile; and the ſum *minus* radius will be the logarithmic tangent of the angle ſought.

Plate XC. fig. 7.

For KC is to KM in the ratio compounded of the ratio of KC to KG ($=KR$) and of KG to KM; which making CK the radius 10,000000, or 10,0000, or 10, or 1, are the ratio of 10,000000, or of 10,0000, or of 10, or of 1, to $KG\times KM$.

Thus, in a horizontal dial, for latitude 51° 30′, to find the angular diſtance of XI in the forenoon, or I the afternoon, from XII:

To

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* That is, of 15, 30, 45, 60, 75°, for the hours of I, II, III, IIII, V, in the afternoon; and XI, X, IX, VIII, VII, in the afternoon.

† In all horizontal dials, and erect north or ſouth dials, the ſubſtile and meridian are the ſame: but in all declining dials, the ſubſtile line makes an angle with the meridian.

Plate. XC.

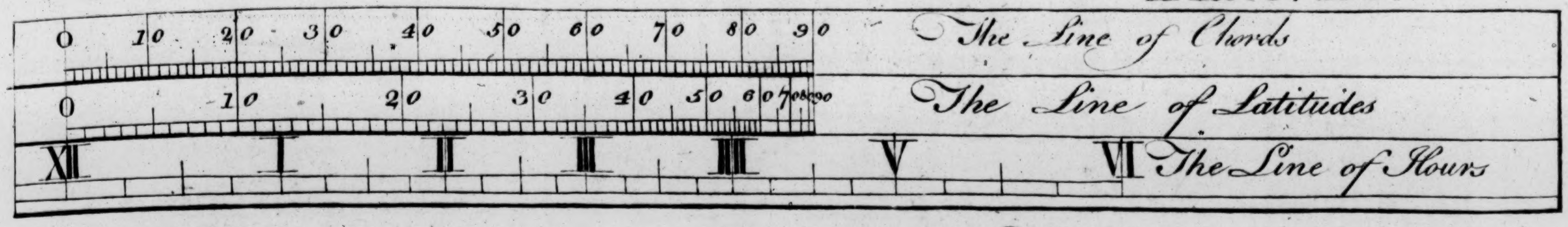

0 10 20 30 40 50 60 70 80 90
The Line of Chords
0 10 20 30 40 50 60 70 80 90
The Line of Latitudes
XII I II III IIII V VI
The Line of Hours

Fig. 2.

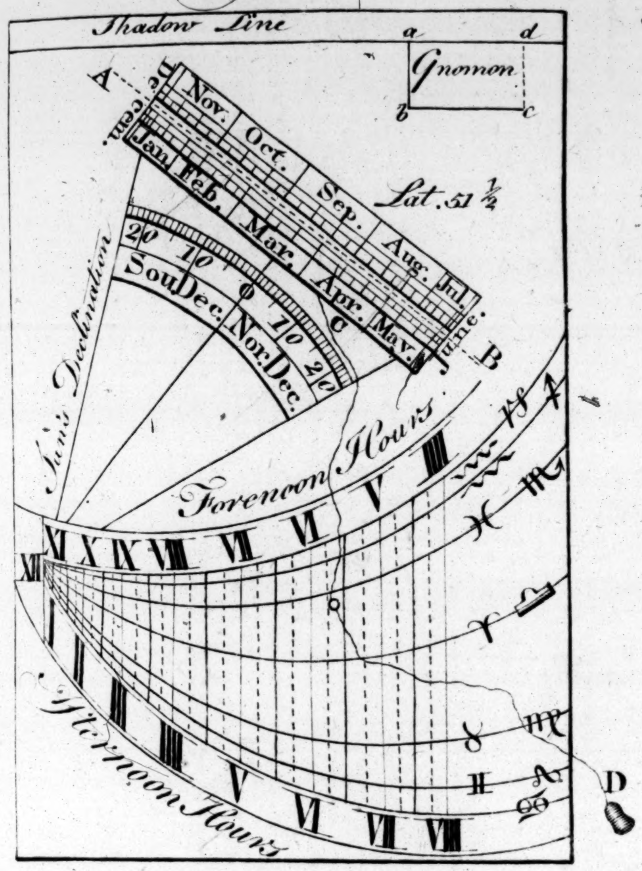

Shadow Line
a d
Gnomon
b c
A
Decem.
Nov.
Oct.
Sep.
Aug.
Jul.
June
Jan.
Feb.
Mar.
Apr.
May.
Lat. 51 1/2
B
Sun's Declination
SouDec.
NorDec.
Forenoon Hours
Afternoon Hours
D

Fig. 1.

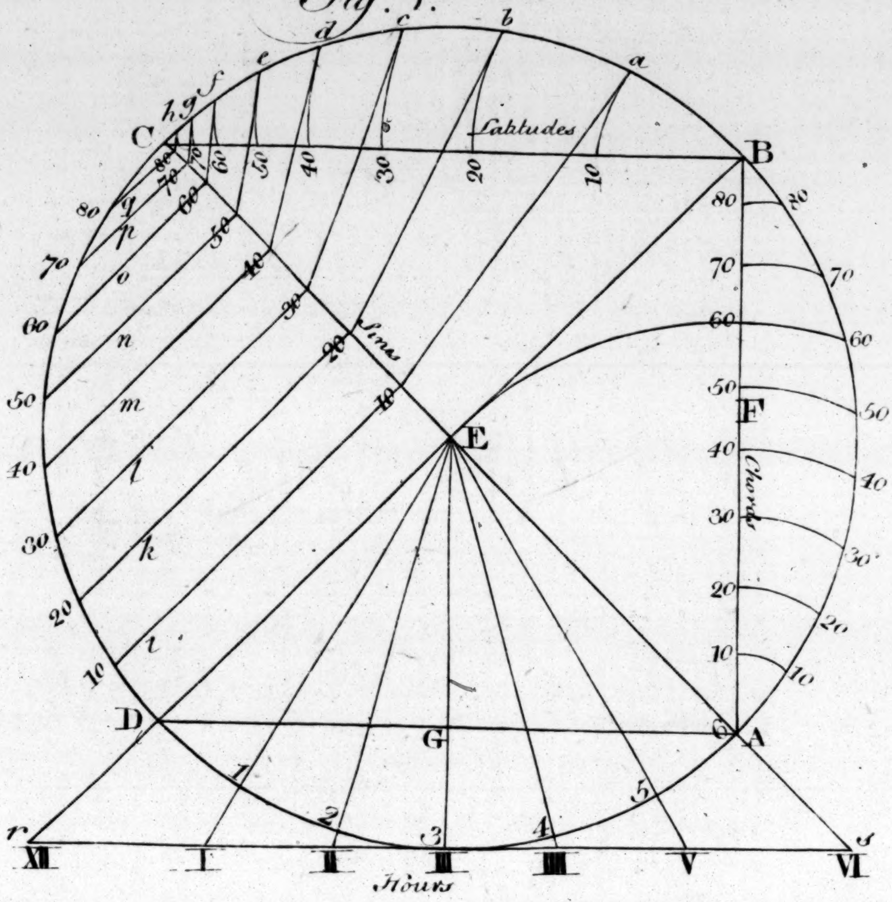

a b c d e f g h
C B
Latitudes
10 20 30 40 50 60 70 80
Sines
E
F
Chords
p o n m l k i
D G A
1 2 3 4 5
r s
XII I II III IIII V VI
Hours

Fig. 6.

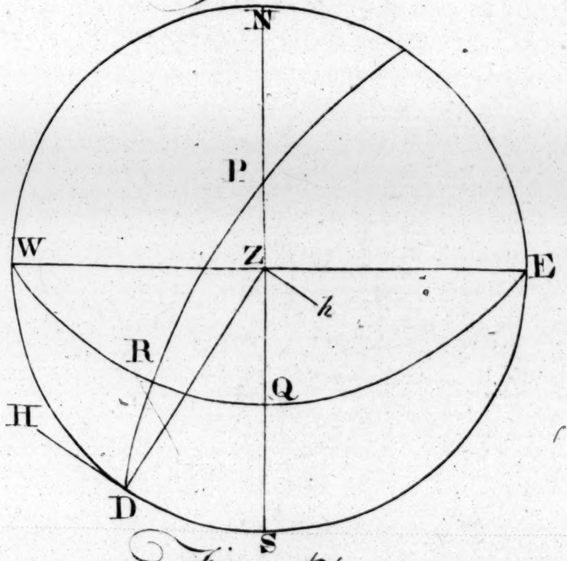

N
P
W Z E
h
R
Q
H
D
S

Fig. 4

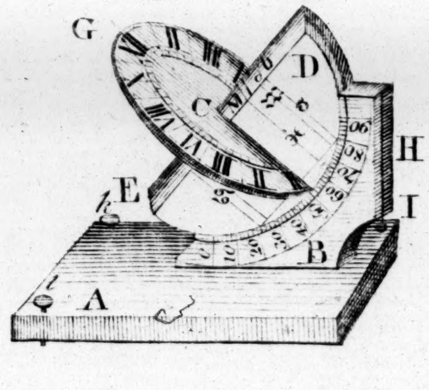

E
G
D
C
H
E
I
h
B
A
l

Fig. 3.

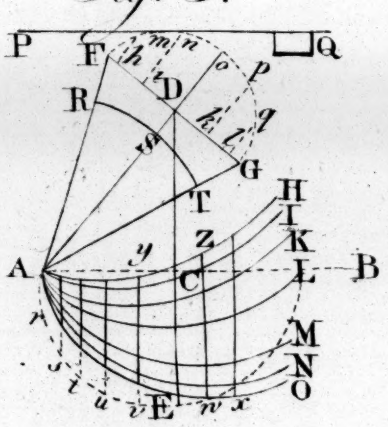
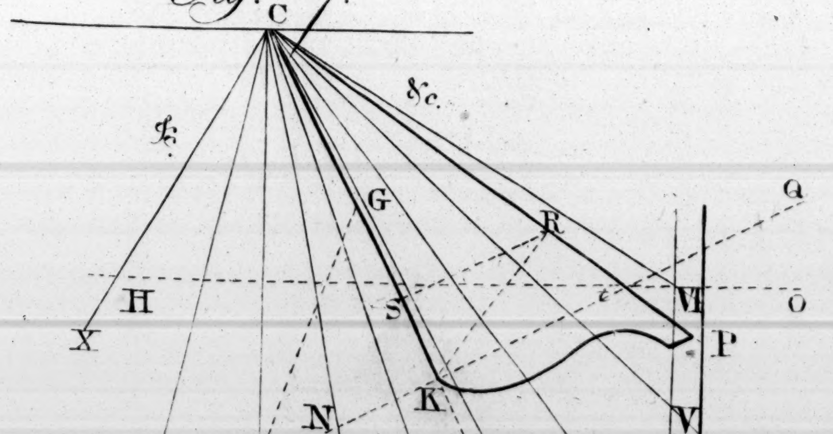

P Q
F h m n o p
D
R k l q
G
T H
I
A y Z K B
C L
M
r N
s t u v E w x O

Fig. 7


C
&c.
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G
R
Q
H
S
O
X
VI
P
N
K
V
h
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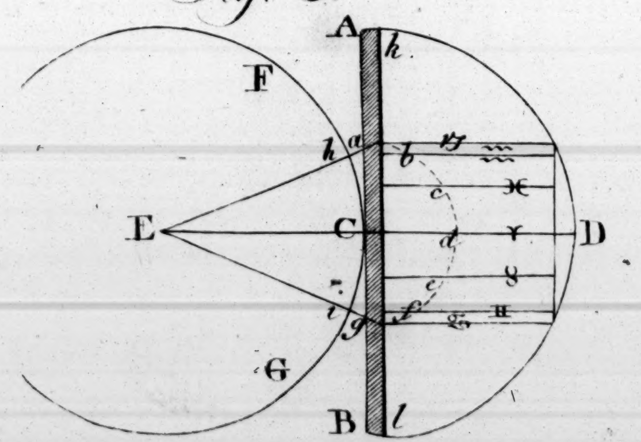
o
VI
VII I II III IIII
E

Fig. 5.


A
h
F
k a
b
c
E C d D
e
i f
g
G
B l

A Bell Sc.

3 MA 53

Dial.

Plate XC. fig. 7.

To the logarithmic ſine of 51° 30′ 9.89354[‡]
Add the logarithmic tang. of 15° 0′ 9.42805

The ſum—radius is - - - - 9.32159=the logarithmic tangent of 11° 50′, or of the angle which the hour-line of XI or I makes with the hour of XII.

And by computing in this manner, with the ſine of the latitude, and the tangents of 30, 45, 60, and 75°, for the hours of II, III, IIII, and V in the afternoon; or of X, IX, VIII, and VII in the forenoon; you will find their angular diſtances from XII to be 24° 18′, 38° 3′, 53° 35′, and 71° 6′; which are all that there is occaſion to compute for.——And theſe diſtances may be ſet off from XII by a line of chords; or rather, by taking 1000 from a ſcale of equal parts, and ſetting that extent as a radius from C to XII; and then, taking 209 of the ſame parts (which, are the natural tangent of 11° 50′), and ſetting them from XII to XI and to I, on the line ho, which is perpendicular to C XII: and ſo for the reſt of the hour-lines, which, in the table of natural tangets, againſt the above diſtances, are 451, 782, 1355, and 2920, of ſuch equal parts from XII, as the radius C XII contains 1000. And, laſtly, ſet off 1257 (the natural tangent of 51° 30′) for the angle of the ſtile's height, which is equal to the latitude of the place.

Rule II. *The latitude of the place, the ſun's declination, and his hour-diſtance from the meridian, being given, to find* (1.) *his altitude;* (2.) *his azimuth.*

Plate XCI. fig. 1.

1. Let d be the ſun's place, dR his declination; and, in the triangle PZd, Pd the ſum, or the difference, of dR, and the quadrant PR, being given by the ſuppoſition, as alſo the complement of the latitude PZ, and the angle dPZ, which meaſures the horary diſtance of d from the meridian; we ſhall (by Caſe 4. of Keill's oblique ſpheric Trigonometry) find the baſe Zd, which is the ſun's diſtance from the zenith, or the complement of his altitude.

And (2.) As ſine Zd: ſine Pd : : ſine $dPZ : dZP$, or of its ſupplement DZS, the azimuthal diſtance from the ſouth.

Or the practical rule may be as follows.

Write A for the ſign of the ſun's altitude, L and l for the ſine and co-ſine of the latitude, D and d for the ſine and co-ſine of the ſun's declination, and H for the ſine of the horary diſtance from VI.

Then the relation of H to A will have three varieties.

1. When the declination is toward the elevated pole, and the hour of the day is between XII and VI; it is $A=LD+Hld$, and $H=\frac{A-LD}{ld}$,

2. When the hour is after VI, it is $A=LD-Hld$, and $H=\frac{LD+A}{ld}$

3. When the declination is toward the depreſſed pole, we have $A=Hld-LD$, and $H=\frac{A+LD}{ld}$.

Which theorems will be found uſeful, and expeditious enough for ſolving thoſe problems in geography and dialing, which depend on the relation of the ſun's altitude to the hour of the day.

Dial.

Plate XCI, fig. 1.

EXAMPLE I.

Suppoſe the latitude of the place to be $51\frac{1}{2}$ degrees north: the time five hours diſtant from XII, that is, an hour after VI in the morning, or before VI in the evening; and the ſun's declination 20° north. *Required the ſun's altitude?*

Then to log. $L=$ log. ſin. 51° 30′ 1.89354[*]
add log. $D=$ log. ſin. 20° 0′ 1.53405

Their ſum 1.42759 gives LD=logarithm of 0.267664, in the natural ſines.

And, to log. $H=$ log. ſin. [†] 15° 0′ 1.41300
add { log. $l=$ log. ſin. [§] 38° 0′ 1.79414
add { log. $d=$ log. ſin. [||] 70° 0′ 1.97300

Their ſum 1.18015 gives Hld=logarithm of 0.151408, in the natural ſines.

And theſe two numbers (0.267664 and 0.151408) make 0.419072=A; which, in the table, is the neareſt natural ſine of 24° 47′, the ſun's altitude ſought.

The ſame hour-diſtance being aſſumed on the other ſide of VI, then $LD - Hld$ is 0.116256, the ſine of 6° 40′$\frac{1}{2}$; which is the ſun's altitude at V in the morning, or VII in the evening, when his north declination is 20°.

But when the declination is 20° ſouth (or towards the depreſſed pole) the difference $Hld-LD$ becomes negative; and thereby ſhews, that, an hour before VI in the morning, or paſt VI in the evening, the ſun's centre is 6° 40′$\frac{1}{2}$ below the horizon.

EXAMPLE II.

From the ſame *data*, to find the ſun's *azimuth*.

If H, L, and D are given, then (by par. 2. of Rule II.) from H having found the altitude and its complement Zd; and the arc Pd (the diſtance from the pole) being given; ſay, As the co-ſine of the altitude is to the ſine of the diſtance from the pole, ſo is the ſine of the hour-diſtance from the meridian to the ſine of the azimuth diſtance from the meridian.

Let the latitude be 51° 30′ north, the declination 15° 9′ ſouth, and the time II h. 24 m. in the afternoon, when the ſun begins to illuminate a vertical wall, and it is required to find the poſition of the wall.

Then, by the foregoing theorems, the complement of the altitude will be 81° 32′$\frac{1}{2}$, and Pd the diſtance from the pole being 109° 5′, and the horary diſtance from the meridian, or the angle dPZ, 36°.

To log. ſin. 74° 51′ - 1.98464
Add. log. ſin. 36° 0′ - 1.76922

And from the ſum - 1.75386
Take the log. ſin. 81° 32$\frac{1}{2}$ - 1.99525

Remains 1.75861=log.ſin. 35°, the azimuth diſtance ſought.

[‡] In which caſe, the radius CK is ſuppoſed to be divided into 100000 equal parts.

[*] Here we conſider the radius as unity, and not 10.00000, by which, inſtead of the index 9, we have —1, as above; which is of no farther uſe than making the work a little eaſier.

[†] The diſtance of one hour from VI.

[§] The co-latitude of the place.

[||] The co-declination of the ſun.

When the altitude is given, find from thence the hour, and proceed as above.

This praxis is of ſingular uſe on many occaſions; in finding the declination of vertical planes more exactly than in the common way, eſpecially if the tranſits of the ſun's centre are obſerved by applying a ruler with ſights, either plain or teleſcopical, to the wall or plane whoſe declination is required.—In drawing a meridian line, and finding the magnetic variation.—In finding the bearings of places in terreſtrial ſurveys; the tranſits of the ſun over any place, or his horizontal diſtance from it, being obſerved, together with the altitude and hour.—And thence determining ſmall differences of longitude.—In obſerving the variations at ſea, &c.

Of the double Horizontal Dial; and the Babylonian *and* Italian *Dials.*

To the *gnomonic* projection, there is ſometimes added a *ſtereographic* projection of the hour-circles, and the parallels of the ſun's declination, on the ſame horizontal plane; the upright ſide of the gnomon being ſloped into an edge, ſtanding perpendicularly over the centre of the projection: ſo that the dial, being in its due poſition, the ſhadow of *that* perpendicular edge is a vertical circle paſſing thro' the ſun, in the ſtereographic projection.

The months being duly marked on this dial, the ſun's declination, and the length of the day at any time, are had by inſpection (as alſo his altitude, by means of a ſcale of tangents.) But its chief property is, that it may be placed true, whenever the ſun ſhines, without the help of any other inſtrument.

Fig. 1.

Let *d* be the ſun's place in the ſtereographic projection, *x d y z* the parallel of the ſun's declination, *Z d* a vertical circle through the ſun's centre, *P d* the hour-circle; and it is evident, that the diameter *NS* of this projection being placed duly north and ſouth, theſe three circles will paſs through the point *d*. And therefore, to give the dial its due poſition, we have only to turn its gnomon toward the ſun, on a horizontal plane, until the hour on the common gnomonic projection coincides with that marked by the hour-circle *P d*, which paſſes through the interſection of the ſhadow Z *d* with the circle of the ſun's preſent declination.

The Babylonian and Italian dials reckon the hours, not from the meridian, as with us, but from the ſun's riſing and ſetting. Thus, in Italy, an hour before ſun-ſet is reckoned the 23d hour; two hours before ſun-ſet the 22d hour; and ſo of the reſt. And the ſhadow that marks them on the hour-lines, is *that* of the point of a ſtile. This occaſions a perpetual variation between their dials and clocks, which they muſt correct from time to time, before it ariſes to any ſenſible quantity, by ſetting their clocks ſo much faſter or ſlower. And in Italy, they begin their day, and regulate their clocks, not from ſun-ſet, but from about mid-twilight, when the *Ave-Maria* is ſaid; which corrects the difference that would otherwiſe be between the clock and the dial.

The improvements which have been made in all ſorts of inſtruments and machines for meaſuring time, have rendered ſuch dials of little account. Yet, as the theory of them is ingenious, and they are really, in ſome reſpects, the beſt contrived of any for vulgar uſe, a general idea of their deſcription may not be unacceptable.

Let fig. 3. repreſent an erect direct ſouth wall, on which a Babylonian dial is to be drawn, ſhewing the hours from ſun-riſing; the latitude of the place, whoſe horizon is parallel to the wall, being equal to the angle KCR. Make, as for a common dial, KG=KR (which is perpendicular to *CR*) the radius of the equinoctial ÆQ, and draw RS perpendicular to CK for the ſtile of the dial; the ſhadow of whoſe point *R* is to mark the hours, when *S R* is ſet upright on the plane of the dial.

Then it is evident, that, in the contingent line *ÆQ*, the ſpaces K 1, K 2, K 3, &c. being taken equal to the tangents of the hour-diſtances from the meridian, to the radius KG, one, two, three, &c. hours after ſun-riſing, on the equinoctial day; the ſhadow of the point *R* will be found, at theſe times, reſpectively in the points 1, 2, 3, &c.

Draw, for the like hours after ſun-riſing, when the ſun is in the tropic of Capricorn ♑ *V*, the like common lines *CD*, *CE*, *CF*, &c. and at theſe hours the ſhadow of the point *R* will be found in thoſe lines reſpectively. Find the ſun's altitudes above the plane of the dial at theſe hours; and with their co-tangents *Sd*, *S e*, *S f*, &c. to radius *S R*, deſcribe arcs interſecting the hour-lines in the points *d*, *e*, *f*, &c. ſo ſhall the right lines 1 *d*, 2 *e*, 3 *f*, &c. be the lines of I, II, III, &c. hours after ſun-riſing.

The conſtruction is the ſame in every other caſe; due regard being had to the difference of longitude of the place at which the dial would be horizontal, and the place for which it is to ſerve: and likewiſe, taking care to draw no lines but what are neceſſary; which may be done partly by the rules already given for determining the time that the ſun ſhines on any plane; and partly from this, that on the tropical days, the hyperbola deſcribed by the ſhadow of the point *R* limits the extent of all the hour-lines.

Of the right placing of dials, and having a true meridian line for the regulating of clocks and watches.

The plane on which the dial is to reſt being duly prepared, and every thing neceſſary for fixing it, you may find the hour tolerably exact by a large equinoctial ring-dial, and ſet your watch to it. And then the dial may be fixed by the watch at your leiſure.

If you would be more exact, take the ſun's altitude by a good quadrant, noting the preciſe time of obſervation by a clock or watch. Then compute the time for the altitude obſerved; and ſet the watch to agree with that time, according to the ſun. A Hadley's quadrant is very convenient for this purpoſe: for by it you may take the angle between the ſun and his image reflected from a baſon of water; the half of which angle, ſubtracting the refraction, is the altitude required. This is beſt done in ſummer; and the nearer the ſun is to the prime vertical (the eaſt or weſt azimuth) when the obſervation is made, ſo much the better.

Or, in ſummer, take two equal altitudes of the ſun in the ſame day; one any time between 7 and 10 in the morning, the other between 2 and 5 in the afternoon; noting the moments of theſe two obſervations by

Plate XCI.

Fig. 1.

Fig. 3.

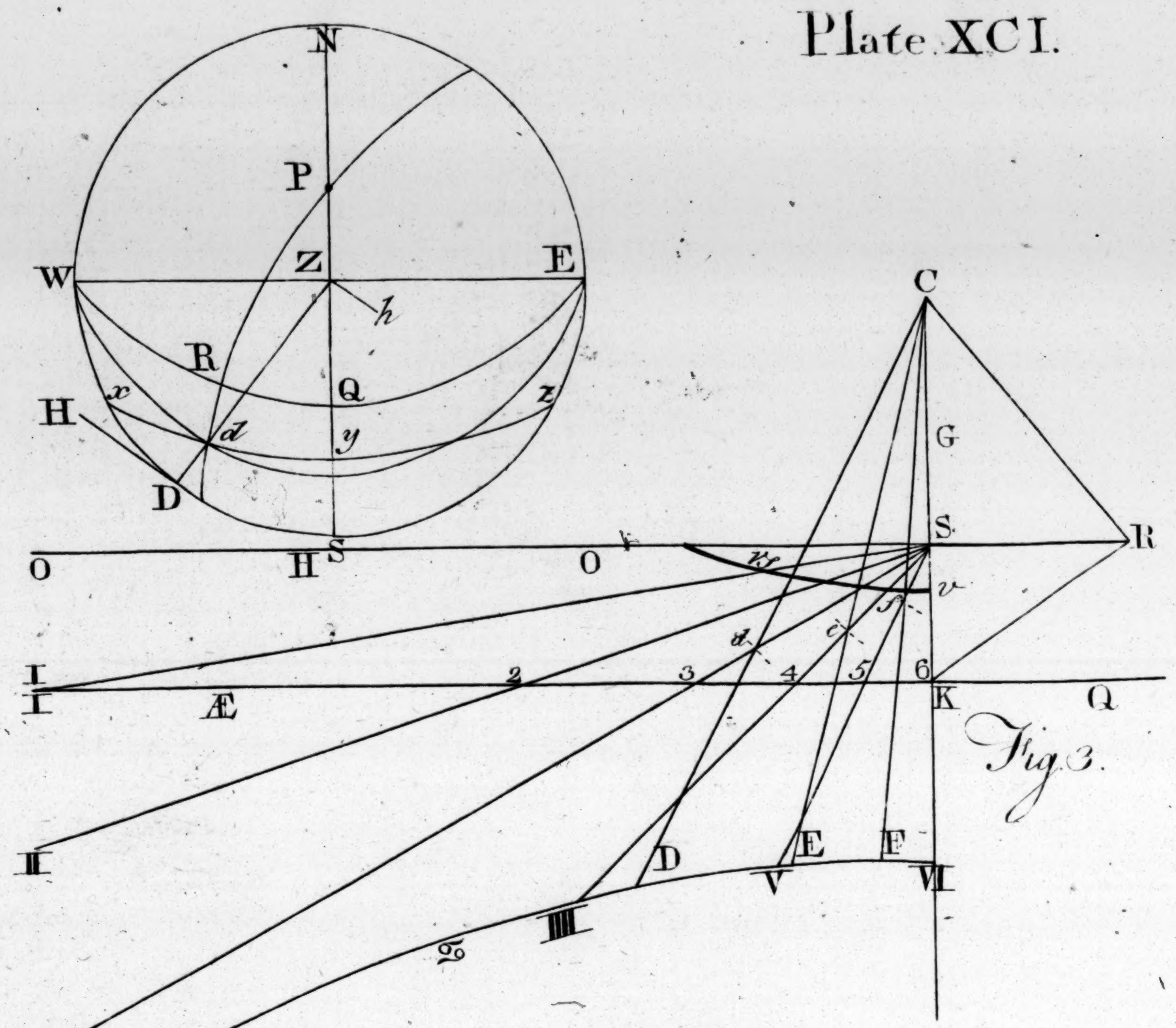

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Fig. 2.

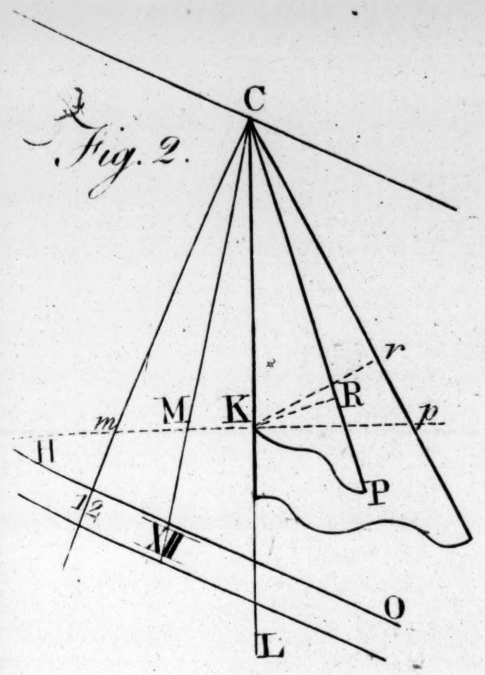
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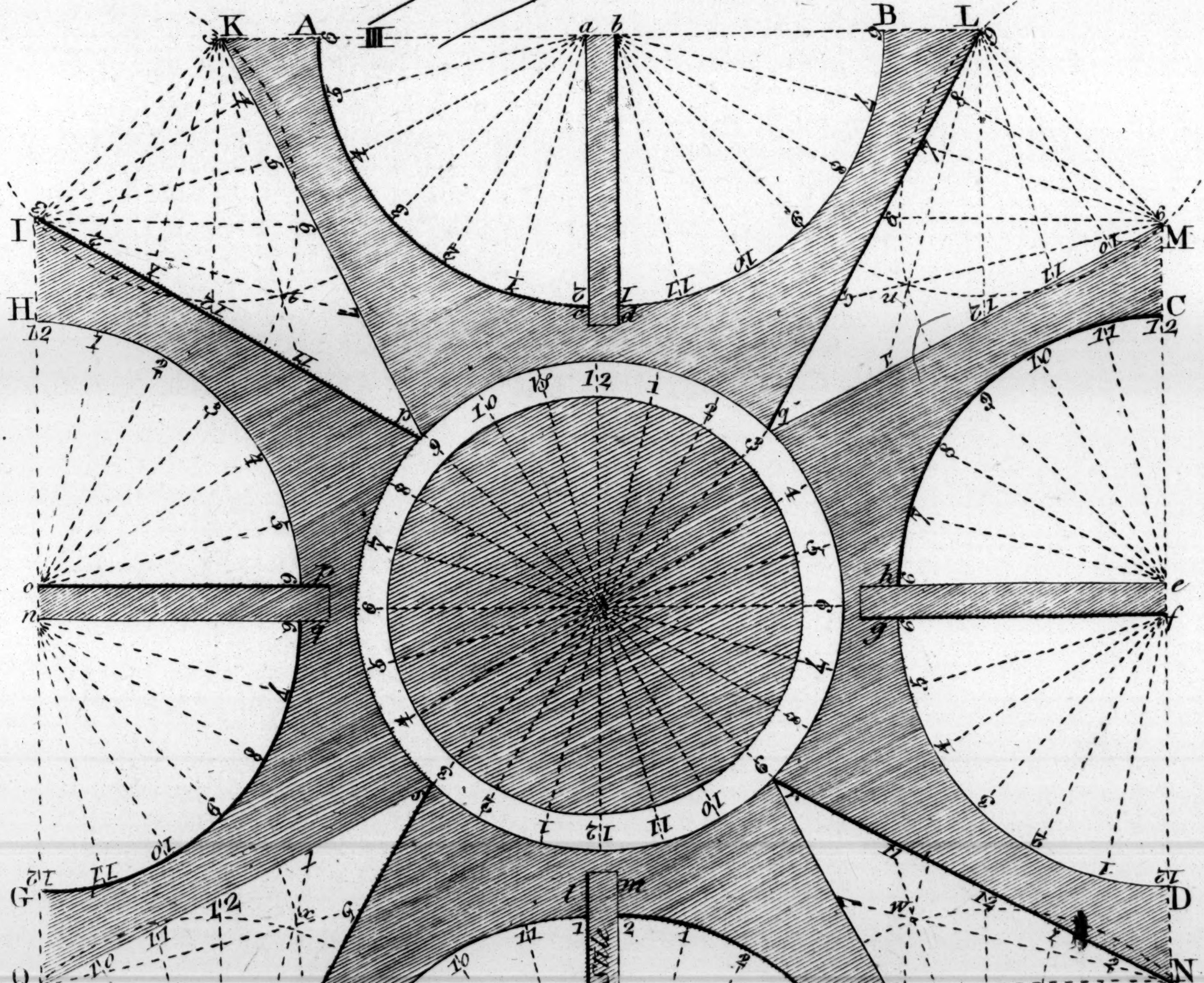
Fig. 4.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A Bell Sculp.

3 MA 55

by a clock or watch: and if the watch ſhews the obſervations to be at equal diſtances from noon, it agrees exactly with the ſun: if not, the watch muſt be corrected by half the difference of the forenoon and afternoon intervals; and then the dial may be ſet true by the watch.

Thus, for example, ſuppoſe you had taken the ſun's altitude when it was 20 minutes paſt VIII in the morning by the watch; and found, by obſerving in the afternoon, that the ſun had the ſame altitude 10 minutes before IIII; then it is plain, that the watch was 5 minutes too faſt for the ſun: for 5 minutes after XII is the middle time between VIII h. 20 m. in the morning, and III. h. 50 m. in the afternoon; and therefore, to make the watch agree with the ſun, it muſt be ſet back five minutes.

A meridian line.

A good *meridian line*, for regulating clocks or watches, may be had by the following method.

Make a round hole, almoſt a quarter of an inch diameter, in a thin plate of metal; and fix the plate in the top of a ſouth window, in ſuch a manner, that it may recline from the zenith at an angle equal to the co-latitude of your place, as nearly as you can gueſs: for then the plate will face the ſun directly at noon on the equinoctial days. Let the ſun ſhine freely thro' the hole into the room; and hang a plumb line to the ceiling of the room, at leaſt five or ſix feet from the window, in ſuch a place as that the ſun's rays, tranſmitted through the hole, may fall upon the line when it is noon by the clock; and having marked the ſaid place on the ceiling, take away the line.

Having adjuſted a ſliding bar to a dove-tail groove, in a piece of wood about 18 inches long, and fixed a hook into the middle of the bar, nail the wood to the above-mentioned place on the ceiling, parallel to the ſide of the room in which the window is; the groove and bar being towards the floor. Then, hang the plumb-line upon the hook in the bar, the weight or plummet reaching almoſt to the floor; and the whole will be prepared for farther and proper adjuſtment.

This done, find the true ſolar time by either of the two laſt methods, and thereby regulate your clock. Then, at the moment of next noon by the clock, when the ſun ſhines, move the ſliding-bar in the groove, until the ſhadow of the plumb-line biſects the image of the ſun (made by his rays tranſmitted thro' the hole) on the floor, wall, or on a white ſcreen placed on the north-ſide of the line; the plummet or weight at the end of the line hanging freely in a pail of water placed below it on the floor.—But becauſe this may not be quite correct for the firſt time, on account that the plummet will not ſettle immediately, even in water; it may be farther corrected on the following days, by the above method, with the ſun and clock; and ſo brought to a very great exactneſs.

N. B. The rays tranſmitted through the hole, will caſt but a faint image of the ſun, even on a white ſcreen, unleſs the room be ſo darkened that no ſunſhine may be allowed to enter but what comes through the ſmall hole in the plate. And always, for ſome time before the obſervation is made, the plummet ought to be immerſed in a jar of water, where it may hang freely; by which means the line will ſoon become ſteady, which otherwiſe would be apt to continue ſwinging.

An Univerſal Dial, ſhewing the hours of the day by a terreſtrial globe, and by the ſhadows of ſeveral gnomons, at the ſame time: together with all the places of the earth which are then enlightened by the ſun; and thoſe to which the ſun is then riſing, or on the meridian, or ſetting.

Plate XCII.

This dial is made of a thick ſquare piece of wood, or hollow metal. The ſides are cut into ſemicircular hollows, in which the hours are placed; the ſtile of each hollow coming out from the bottom thereof, as far as the ends of the hollows project. The corners are cut out into angles, in the inſides of which the hours are alſo marked; and the edge of the end of each ſide of the angle ſerves as a ſtile for caſting a ſhadow on the hours marked on the other ſide.

In the middle of the uppermoſt ſide, or plane, there is an equinoctial dial; in the centre whereof an upright wire is fixed, for caſting a ſhadow on the hours of that dial, and ſupporting a ſmall terreſtrial globe on its top.

The whole dial ſtands on a pillar, in the middle of a round horizontal board, in which there is a compaſs and magnetic needle, for placing the *meridian* ſtile toward the ſouth. The pillar has a joint with a quadrant upon it, divided into 90 degrees (ſuppoſed to be hid from ſight under the dial in the figure) for ſetting it to the latitude of any given place.

The equator of the globe is divided into 24 equal parts, and the hours are laid down upon it at theſe parts. The time of the day may be known by theſe hours, when the ſun ſhines upon the globe.

To rectify and uſe this dial, ſet it on a level table, or ſole of a window, where the ſun ſhines, placing the meridian ſtile due ſouth, by means of the needle; which will be, when the needle points as far from the north fleur-de-lis toward the weſt, as it declines weſtward, at your place. Then bend the pillar in the joint, till the black line on the pillar comes to the latitude of your place in the quadrant.

The machine being thus rectified, the plane of its dial-part will be parallel to the equator, the wire or axis that ſupports the globe will be parallel to the earth's axis, and the north pole of the globe will point toward the north pole of the heavens.

The ſame hour will then be ſhewn in ſeveral of the hollows, by the ends of the ſhadows of their reſpective ſtiles: the axis of the globe will caſt a ſhadow on the ſame hour of the day, in the equinoctial dial, in the centre of which it is placed, from the 20th of March to the 23d of September; and, if the meridian of your place on the globe be ſet even with the meridian ſtile, all the parts of the globe that the ſun ſhines upon, will anſwer to thoſe places of the real earth which are then enlightened by the ſun. The places where the ſhade is juſt coming upon the globe, anſwer to all thoſe places of the earth to which the ſun is then ſetting; as the places where it is going off, and the light coming on, anſwer to all the places of the earth where the ſun is then riſing. And laſtly, if the hour of VI be marked on the equator in the meridian of your place (as it is marked on the meridian of London in the figure) the diviſion of the light and ſhade on the globe will ſhew the time of the day.

The northern ſtile of the dial (oppoſite to the ſouthern or meridian one) is hid from ſight in the figure, by the axis of the globe. The hours in the hollow to which that ſtile belongs, are alſo ſuppoſed to be hid by the oblique view of the figure: but they are the ſame as the hours in the front-hollow. Theſe alſo in the right and left hand ſemicircular hollows are moſtly hid from ſight; and ſo alſo are all thoſe on the ſides next the eye of the four acute angles.

The conſtruction of this dial is as follows:

Plate XCI. fig 4.

On a thick ſquare piece of wood, or metal, draw the lines *a c* and *b d*, as far from each other as you intend for the thickneſs of the ſtile *a b c d*; and in the ſame manner, draw the like thickneſs of the other three ſtiles, *e f g h*, *i k l m*, and *n o p q*, all ſtanding outright as from the centre.

With any convenient opening of the compaſſes, as *a A*, (ſo as to leave proper ſtrength of ſtuff when *KI* is equal to *a A*), ſet one foot in *a*, as a centre, and with the other foot deſcribe the quadrantal arc *Ac*. Then, without altering the compaſſes, ſet one foot in *b* as a centre, and with the other foot deſcribe the quadrant *dB*. All the other quadrants in the figure muſt be deſcribed in the ſame manner, and with the ſame opening of the compaſſes, on their centres *e f*, *i k*, and *n o*; and each quadrant divided into ſix equal parts, for as many hours, as in the figure; each of which parts muſt be ſubdivided into 4, for the half-hours and quarters.

At equal diſtances from each corner, draw the right lines *I p* and *K p*, *L q* and *M q*, *N r* and *O r*, *P s* and *Q s*; to form the four angular hollows *I p K*, *L q M*, *N r O*, and *P s Q*; making the diſtances between the tips of theſe hollows, as *I K*, *L M*, *N O*, and *P Q*, each equal to the radius of the quadrants; and leaving ſufficient room within the angular points *p q r* and *s*, for the equinoctial in the middle.

To divide the inſides of theſe angles properly for the hour-ſpaces thereon, take the following method.

Set one foot of the compaſſes in the point *I*, as a centre, and open the other to *K*; and with that opening deſcribe the arc *Kt*: then, without altering the compaſſes, ſet one foot in *K*, and with the other foot deſcribe the arc *I t*. Divide each of theſe arcs, from *I* and *K* to their interſection at *t*, into four equal parts; and from their centres *I* and *K*, through the points of diviſion, draw the right lines *I* 3, *I* 4, *I* 5, *I* 6, *I* 7; and *K* 2, *K* 1, *K* 12, *K* 11; and they will meet the ſides *Kp* and *Ip* of the angle *IpK* where the hours thereon muſt be placed. And theſe hour-ſpaces in the arcs muſt be ſubdivided into four equal parts, for the half hours and quarters.—Do the like for the other three angles, and draw the dotted lines, and ſet the hours in the inſides where thoſe lines meet them, as in the figure: and the like hour-lines will be parallel to each other in all the quadrants and in all the angles.

Mark points for all theſe hours on the upper ſide; and cut out all the angular hollows, and the quadrantal ones quite through the places where their four gnomons muſt ſtand; and lay down the hours on their inſides, (as in Plate XCII.), and ſet in their gnomons, which muſt be as broad as the dial is thick; and this breadth and thickneſs muſt be large enough to keep the ſhadows of the gnomons from ever falling quite out at the ſides of the hollows, even when the ſun's declination is at the greateſt.

Laſtly, draw the equinoctial dial in the middle, all the hours of which are equidiſtant from each other: and the dial will be finiſhed.

As the ſun goes round, the broad end of the ſhadow of the ſtile *a c b d* will ſhew the hours in the quadrant *Ac*, from ſun-riſe till VI in the morning; the ſhadow from the end *M* will ſhew the hours on the ſide *Lq* from V to IX in the morning; the ſhadow of the ſtile *e f g h* in the quadrant *D g* (in the long days) will ſhow the hours from ſun-riſe till VI in the morning; and the ſhadow of the end *N* will ſhew the morning-hours, on the ſide *O r*, from III to VII.

Juſt as the ſhadow of the northern ſtile *a b c d* goes off the quadrant *Ac*, the ſhadow of the ſouthern ſtile *i k l m* begins to fall within the quadrant *F l*, at VI in the morning; and ſhews the time, in that quadrant, from VI till XII at noon; and from noon till VI in the evening in the quadrant *mE*. And the ſhadow of the end *O*, ſhews the time from XI in the forenoon till III in the afternoon, on the ſide *rN*; as the ſhadow of the end *P* ſhews the time from IX in the morning till I o'clock in the afternoon, on the ſide *Qs*.

At noon, when the ſhadow of the eaſtern ſtile *efgh* goes off the quadrant *hC* (in which it ſhewed the time from VI in the morning till noon, as it did in the quadrant *gD* from ſun-riſe till VI in the morning) the ſhadow of the weſtern ſtile *n o p q* begins to enter the quadrant *Hp*; and ſhews the hours thereon from XII at noon till VI in the evening; and after *that* till ſunſet, in the quadrant *qG*: and the end *Q* caſts a ſhadow on the ſide *Ps* from V in the evening till IX at night, if the ſun be not ſet before that time.

The ſhadow of the end *I* ſhews the time on the ſide *Kp* from III till VII in the afternoon; and the ſhadow of the ſtile *a b c d* ſhews the time from VI in the evening till the ſun ſets.

The ſhadow of the upright central wire, that ſupports the globe at top, ſhews the time of the day, in the middle or equinoctial dial, all the ſummer half-year, when the ſun is on the north ſide of the equator.

DIALECT, an appellation given to the language of a province, in ſo far as it differs from that of the whole kingdom. The term, however, is more particularly uſed in ſpeaking of the ancient Greek, whereof there were four dialects, the Attic, Ionic, Æolic, and Doric, each of which was a perfect language in its kind, that took place in certain countries, and had peculiar beauties.

In Great Britain, beſides the grand diverſity of Engliſh and Scotch, almoſt every county has a dialect of its own, all differing conſiderably in pronunciation, accent, and tone, although one and the ſame language.

DIALECTICS, in the literary hiſtory of the ancients, that branch of logics which taught the rules and modes of reaſoning. See Logic, Part III.

DIALIA, in antiquity, ſacrifices performed by the flamen *dialis*. See Flamen.

DIALING, the art of drawing dials, on any given plane, or on the ſurface of any given body. See Dial.

The Greeks and Latins called this art *gnomonica* and *ſciatherica*, by reaſon it diſtinguiſhes the hours by the ſhadow of a gnomon. Some call it *photo-ſciatherica*, by

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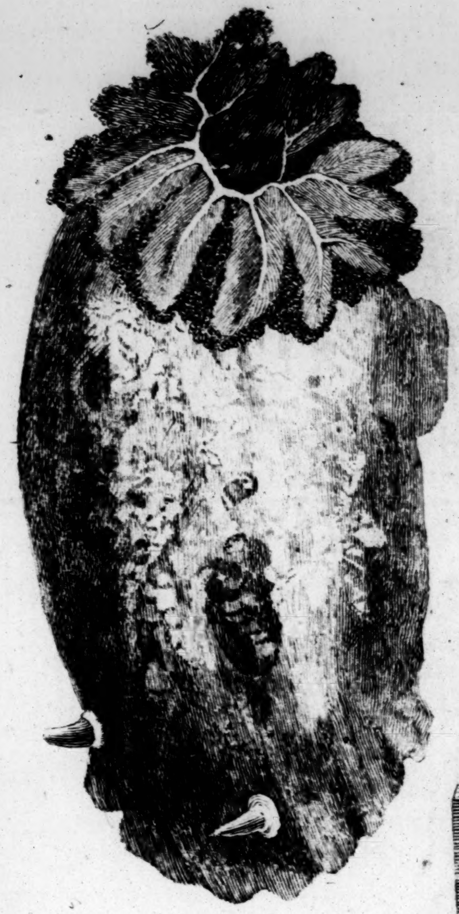
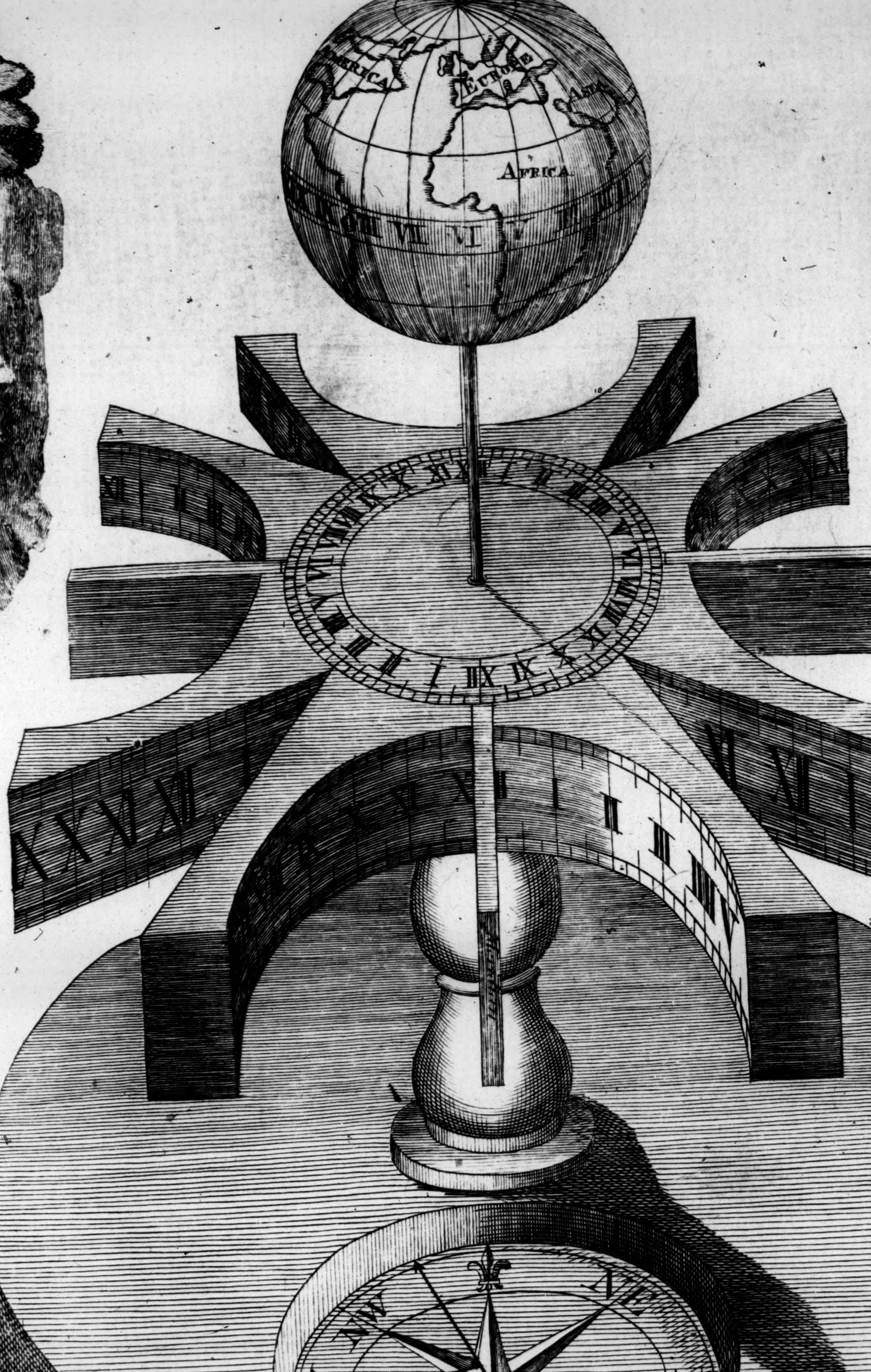
Plate XCII.

DORIS.
N°. 1.

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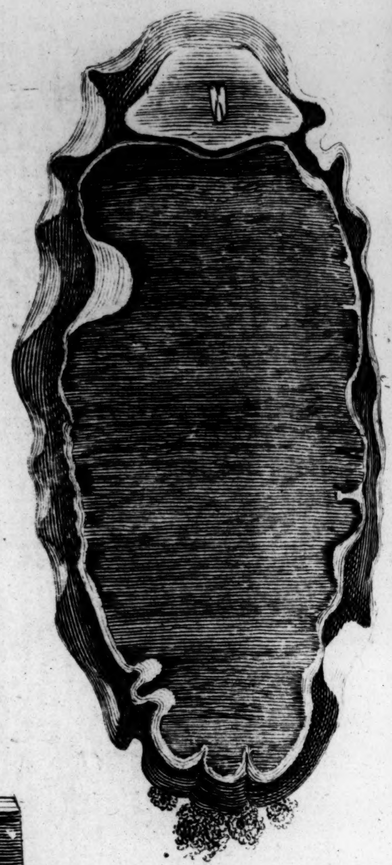

I. Bell Sculpt.

by reaſon the hours are ſometimes ſhewn by the light of the ſun. Laſtly, others call it *horologiography*.

The antiquity of dials is beyond doubt. Some attribute their invention to Anaximenes Mileſius; and others to Thales. Vitruvius mentions one made by the ancient Chaldee hiſtorian Beroſus, on a reclining plane, almoſt parallel to the equinoctial. Ariſtarchus Samius invented the hemiſpherical dial. And there were ſome ſpherical ones, with a needle for a gnomon. The diſcus of Ariſtarchus was an horizontal dial, with its limb raiſed up all around, to prevent the ſhadows ſtretching too far.

But it was late ere the Romans became acquainted with dials. The firſt ſun-dial at Rome was ſet up by Papirius Curſor, about the year of the city 460; before which time, ſays Pliny, there is no mention of any account of time but by the ſun's riſing and ſetting: it was ſet up at or near the temple of Quirinus, but went ill. About 30 years after, M. Valerius Meſſala being conſul, brought out of Sicily another dial, which he ſet up on a pillar near the roſtrum; but for want of its being made for that latitude, it could not go true. They made uſe of it 99 years; till Martius Philippus ſet up another more exact.

But there ſeem to have been dials among the Jews much earlier than any of theſe. Witneſs the dial of Ahaz; who began to reign 400 years before Alexander, and within 12 years of the building of Rome; mentioned by Iſaiah, chap. xxxviii. verſe 8.

The firſt profeſſed writer on dialing is Clavius; who demonſtrates all, both the theory and the operations, after the rigid manner of the ancient mathematicians; but ſo intricately, that few, we dare ſay, ever read them all. Dechales and Ozanam give much eaſier demonſtrations in their *Courſes*, and Wolfius in his *Elements*. M. Picard has given a new method of making large dials, by calculating the hour-lines; and Mr de la Hire, in his *Dialing*, printed in 1683, a geometrical method of drawing hour-lines from certain points determined by obſervation. Eberhardus Welperus, in 1625, publiſhed his *Dialing*, wherein he lays down a method of drawing the primary dials on a very eaſy foundation. The ſame foundation is deſcribed at length by Sebaſtian Munſter, in his *Rudimenta Mathematica*, publiſhed in 1551. Sturmius, in 1672, publiſhed a new edition of Welperus's *Dialing*, with the addition of a whole ſecond part, about inclining and declining dials, &c. In 1708, the ſame work, with Sturmius's additions, was republiſhed with the addition of a fourth part, containing Picard's and de la Hire's methods of drawing large dials. Paterſon, Michael, and Muller, have each wrote on dialing, in the German tongue; Coetſius in his *Horologiographia Plana*, printed in 1689; Gauppenius, in his *Gnomonica Mechanica*; Bion, in his *Uſe of Mathematical Inſtruments*; and the late ingenious Mr Ferguſon, in his *Select Lectures*. See the article Dial.

Dialing-*Lines*, or *Scales*, are graduated lines, placed on rules, or the edges of quadrants, and other inſtruments, to expedite the conſtruction of dials. See Dial, p. 2442, col. 2. and Plate XC.

Dialing-*Sphere*, is an inſtrument made of braſs, with ſeveral ſemicircles ſliding over one another, on a moving horizon, to demonſtrate the nature of the doctrine of ſpherical triangles, and to give a true idea of the drawing of dials on all manner of planes.

Dialing, in a mine, called alſo *Plumming*, is the uſing of a compaſs (which they call *dial*), and a long line, to know which way the load, or vein of ore inclines, or where to ſhift an air-ſhaft, or bring an adit to a deſired place.

DIALIS, in antiquity, a Latin term ſignifying ſomething that belongs to Jupiter.—The word is formed from Διος, the genitive of Ζευς, *Jupiter*.

Flamen Dialis. See Flamen.

DIALITHA, in the writings of the ancients, a word uſed to expreſs the elegant ornaments of the Greeks and Romans, compoſed of gold and gems. They alſo called theſe, *lithocolla*, "cemented ſtones or gems;" the gold being in this caſe as a cement to hold the ſtones together. They wore bracelets and other ornamental things about their habits thus made; and their cups and table-furniture, for magnificent treats, were of this kind. The green ſtones were found to ſucceed beſt of all in theſe things; and the emerald, and greeniſh topaz, or, as we call it, chryſolite, were moſt in eſteem for this purpoſe. This uſe of the ſtones explains what Pliny very often ſays of them in his deſcription: *Nihil jucundius aurum decet*, "Nothing becomes gold better:" this he ſays of the green topaz or chryſolite; and this and many other like paſſages have greatly perplexed the critics, who did not hit upon this explication.

DIALOGISM, in rhetoric, is uſed for the ſoliloquy of perſons deliberating with themſelves. See Soliloquy.

DIALOGUE, in matters of literature, a converſation between two or more perſons, either by writing or by word of mouth.

Compoſition and Style of Written Dialogue. As the end of ſpeech is converſation, no kind of writing can be more natural than dialogue, which repreſents this. And accordingly we find it was introduced very early, for there are ſeveral inſtances of it in the Moſaic hiſtory. The ancient Greek writers alſo fell very much into it, eſpecially the philoſophers, as the moſt convenient and agreeable method of communicating their ſentiments and inſtructions to mankind. And indeed it ſeems to be attended with very conſiderable advantages, if well and judiciouſly managed. For it is capable to make the drieſt ſubjects entertaining and pleaſant, by its variety, and the different characters of the ſpeakers. Beſides, things may be canvaſſed more minutely, and many leſſer matters, which ſerve to clear up a ſubject, may be introduced with a better grace, by queſtions and anſwers, objections and replies, than can be conveniently done in a continued diſcourſe. There is likewiſe a further advantage in this way of writing, that the author is at liberty to chooſe his ſpeakers: And therefore, as Cicero has well obſerved, when we imagine, that we hear perſons of an eſtabliſhed reputation for wiſdom and knowledge talking together, it neceſſarily adds a weight and authority to the diſcourſe, and more cloſely engages the attention. The ſubject-matter of it is very extenſive. For whatever is a proper argument of diſcourſe, public or private, ſerious or jocoſe; whatever is fit for wiſe and ingenious men to talk upon, either for improvement or diverſion; is ſuitable for a dialogue.

From this general account of the nature of dialogue, it is eaſy to perceive what kind of ſtyle beſt ſuits it. Its affinity with EPISTLES, ſhews there ought to be no great difference between them in this reſpect. Indeed, ſome have been of opinion, that it ought rather to ſink below that of an epiſtle, becauſe dialogues ſhould in all reſpects repreſent the freedom of converſation; whereas, epiſtles ought ſometimes to be compoſed with care and accuracy, eſpecially when written to ſuperiors. But there ſeems to be little weight in this argument, ſince the deſign of an epiſtle is to ſay the ſame things, and in the ſame manner, as the writer judges would be moſt fit and proper for him to ſpeak, if preſent. And the very ſame thing is deſigned in a dialogue, with reſpect to the ſeveral perſons concerned in it. Upon the whole, therefore, the like plain, eaſy, and ſimple ſtyle, ſuited to the nature of the ſubject, and the particular characters of the perſons concerned, ſeems to agree to both.

But as greater ſkill is required in writing dialogues, than letters; we ſhall give a more particular account of the principal things neceſſary to be regarded in their compoſition, and illuſtrate them chiefly from Cicero's excellent *Dialogues concerning an orator*.—A dialogue, then, conſiſts of two parts; an *introduction*, and *the body of the diſcourſe*.

1. The *introduction* acquaints us with the place, time, perſons, and occaſion, of the converſation. Thus Cicero places the ſcene of his dialogues at Craſſus's country ſeat; a very proper receſs, both for ſuch a debate, and the parties engaged in it. And as they were perſons of the firſt rank, and employed in the greateſt affairs of ſtate, and the diſcourſe held them for two days; he repreſents it to have happened at the time of a feſtival, when there was no buſineſs done at Rome, which gave them an opportunity to be abſent.

And becauſe the greateſt regard is to be had in the choice of the perſons, who ought to be ſuch as are well acquainted with the ſubject upon which they diſcourſe; in theſe dialogues of Cicero, the two principal diſputants are Craſſus and Antony, the greateſt orators of that age, and therefore the moſt proper perſons to diſpute upon the qualifications neceſſary for their art. One would think it ſcarce neceſſary to obſerve, that the conference ſhould be held by perſons who lived at the ſame time, and ſo were capable to converſe together. But yet, ſome good writers have run into the impropriety of feigning dialogues between perſons who lived at diſtant times. Plato took this method, in which he has been followed by Macrobius. But others, who have been willing to bring perſons to diſcourſe together, who lived in different ages, without ſuch inconſiſtency, have wrote dialogues of the dead. Lucian has made himſelf moſt remarkable in this way. As to the number of perſons in a dialogue, they may be more or leſs: ſo many, as can conveniently carry on a converſation without diſorder or confuſion, may be admitted. Some of Cicero's dialogues have only two, others three or more, and thoſe concerning an orator ſeven. And it is convenient they ſhould all, in ſome reſpects, be perſons of different characters and abilities; which contributes both to the variety and beauty of the diſcourſe, like the different attitude of figures in a picture. Thus in Cicero's dialogues laſt mentioned, Craſſus excelled in art, Antony principally for the force of his genius, Catullus for the purity of his ſtyle, Scevola for his ſkill in the law, Cæſar for wit and humour; and though Sulpitius and Cotta, who were young men, were both excellent orators, yet they differed in their manner. But there ſhould be always one chief perſon, who is to have the main part of the converſation; like the hero in an epic poem or a tragedy, who excells the reſt in action; or the principal figure in a picture, which is moſt conſpicuous. In Plato's dialogues, this is Socrates; and Craſſus, in thoſe of Cicero above mentioned.

It is uſual, likewiſe, in the introduction, to acquaint us with the occaſion of the diſcourſe. Indeed this is not always mentioned; as in Cicero's dialogue of the parts of oratory, where the ſon begins immediately with deſiring his father to inſtruct him in the art. But it is generally taken notice of, and moſt commonly repreſented, as accidental. The reaſon of which may be, that ſuch diſcourſes appear moſt natural; and may likewiſe afford ſome kind of apology for the writer in managing his different characters, ſince the greateſt men may be ſuppoſed not always to ſpeak with the utmoſt exactneſs in an accidental converſation. Thus Cicero, in his dialogues concerning an orator, makes Craſſus occaſionally fall upon the ſubject of oratory, to divert the company from the melancholy thoughts of what they had been diſcourſing of before, with relation to the public diſorders, and the dangers which threatened their country. But the introduction ought not to be too long and tedious. Mr Addiſon complains of this fault in ſome authors of this kind. "For though, as he ſays, ſome of the fineſt treatiſes of the moſt polite Latin and Greek writers are in dialogue, as many very valuable pieces of French, Italian, and Engliſh, appear in the ſame dreſs; yet in ſome of them there is ſo much time taken up in ceremony, that, before they enter on their ſubject, the dialogue is half over."

2. We come now to the *body* of the diſcourſe, in which ſome things relating to the perſons, and others to the ſubject, are proper to be remarked.

And as to the *perſons*, the principal thing to be attended to, is to keep up a juſtneſs of character thro' the whole. And the diſtinct characters ought to be ſo perfectly obſerved, that from the very words themſelves it may be always known who is the ſpeaker. This makes dialogue more difficult than ſingle deſcription, by reaſon of the number and variety of characters which are to be drawn at the ſame time, and each of them managed with the greateſt propriety. The principal ſpeaker ſhould appear to be a perſon of great ſenſe and wiſdom, and beſt acquainted with the ſubject. No queſtion ought to be aſked him, or objection ſtarted to what he ſays, but what he ſhould fairly anſwer. And what is ſaid by the reſt ſhould principally tend to promote his diſcourſe, and carry it through in the moſt artful and agreeable manner. Where the argument is attended with difficulties, one other perſon or more may be introduced, of equal reputation, or near it, but of different ſentiments, to oppoſe him and maintain the contrary ſide of the queſtion. This gives opportunity for a thorough examination of the point on both ſides, and anſwering all objections. But if the combatants are not pretty equally matched, and maſters of the ſubject, they will treat it but ſuperficially. And through the whole debate, there ought not to be the leaſt wrangling, peeviſhneſs, or obſtinacy; nothing but the appearance of good-humour and good breeding, the gentleman and the friend, with a readineſs to ſubmit to conviction, and the force of truth, as the evidence ſhall appear on one ſide or the other. In Cicero, theſe two characters are Craſſus and Antony. And from them Mr Addiſon ſeems to have taken his Philander and Cynthio, in his *Dialogues upon the uſefulneſs of ancient medals*, which are formed pretty much on Cicero's plan. Where younger perſons are preſent, or ſuch who are not equally acquainted with the ſubject, they ſhould be rather upon the inquiry than diſpute: And the queſtions they aſk ſhould be neither too long, nor too frequent; that they may not too much interrupt the debate, or appear over talkative before wiſer and more experienced perſons. Sulpitius and Cotta ſuſtain this character in Cicero, and Eugenius in Mr Addiſon. And it is very convenient there ſhould be one perſon of a witty and jocoſe humour, to enliven the diſcourſe at proper ſeaſons, and make it the more entertaining, eſpecially when the dialogue is drawn out to any conſiderable length. Cæſar has this part in Cicero. And in Mr Addiſon, Cynthio is a perſon of this turn, and oppoſes Philander in a merry way. Mr Addiſon's ſubject admitted of this; but the ſeriouſneſs and gravity of Cicero's argument required a different ſpeaker for the jocoſe part. Many perſons ought not to ſpeak immediately one after another. Horace's rule for plays is:

> To crowd the ſtage is odious and abſurd,
> Let no fourth actor ſtrive to ſpeak a word.

Though Scaliger and others think a fourth perſon may ſometimes be permitted to ſpeak in the ſame ſcene without confuſion. However, if this is not commonly to be allowed upon the ſtage, where the actors are preſent, and may be diſtinguiſhed by their voice and habit; much leſs in a dialogue, where you have only their names to diſtinguiſh them.

With regard to the *ſubject*, all the arguments ſhould appear probable at leaſt, and nothing be advanced which may ſeem weak or trivial. There ought alſo to be an union in dialogue, that the diſcourſe may not ramble, but keep up to the main deſign. Indeed, ſhort and pleaſant progreſſions are ſometimes allowable for the eaſe and entertainment of the reader. But every thing ſhould be ſo managed, that he may ſtill be able to carry on the thread of the diſcourſe in his mind, and keep the main argument in view, till the whole is finiſhed. The writers of dialogue have not confined their diſcourſes to any certain ſpace of time; but either concluded them with the day; or broke off when their ſpeakers have been tired, and reaſſumed them again the next day. Thus Cicero allows two days for his three dialogues concerning an orator; but Mr Addiſon extends his to three days, allowing a day for each. Nor has the ſame method always been obſerved in compoſing dialogues. For ſometimes the writer, by way of narrative, relates a diſcourſe which paſſed between other perſons. Such are the dialogues of Cicero and Mr Addiſon laſt mentioned, and many others both of the ancients and moderns. But, at other times, the ſpeakers are introduced in perſon, as talking to each other. This, as Cicero obſerves, prevents the frequent repetition of thoſe words, *he ſaid*, and *he replied*; and by placing the hearer, as it were, in the converſation, gives him a more lively repreſentation of the diſcourſe, which makes it the more affecting. And therefore Cicero, who wrote his *dialogue of old age* in this manner, in which Cato, who was then in years, largely recounts the ſatisfactions of life which may be enjoyed in old age, tells his friend Atticus, he was himſelf ſo affected with that diſcourſe, that when he reviewed it ſometimes, he fancied they were not his own words, but Cato's. There are ſome other dialogues of Cicero, written in the ſame way; as that *Of friendſhip*, and *Of the parts of oratory*. And both Plato and Lucian generally choſe this method.

Dialogue, in dramatic compoſition. See Poetry, chap. ii. 22, 23.

DIALTHÆA, in pharmacy, an unguent much uſed as a reſolvent; ſo called from Althæa, or marſh-mallows, which is the principal ingredient in it.

DIALYSIS, in grammar, a mark or character, conſiſting of two points, ¨, placed over two vowels of a word, in order to ſeparate them, becauſe otherwiſe they would make a diphthong, as *Moſaïc*, &c.

DIAMASTIGOSIS, in Grecian antiquity, a ſolemnity at Sparta in honour of Diana Orthia, wherein the children of the moſt diſtinguiſhed families were wont to ſlaſh and tear each others bodies with rods before the altar of the goddeſs: the parents of the children being always preſent, uſed to animate and excite them not to give the leaſt ſign of pain or concern; and indeed ſo great was the bravery and reſolution of the boys, that ſeldom or never any cry or groan was heard to proceed from them, tho' they frequently whipped one another to death. The deſign of this cuſtom was to fortify the children betimes, and harden them againſt wounds, bruiſes, &c.

DIAMETER, in geometry, a right line paſſing thro' the centre of a circle, and terminated at each ſide by the circumference thereof. See Geometry.

DIAMOND, in natural hiſtory, a genus of precious ſtones, of a fine pellucid ſubſtance, of great hardneſs, ſeldom fouled by any admixture of earthy or other coarſe matter, ſuſceptible of elegant tinges from metalline particles, giving fire with ſteel, not fermenting with acid menſtruums, and of one ſimple and permanent appearance in all lights.

Diamonds are the hardeſt and moſt brilliant of all ſtones. They are either hexagonal priſms, terminated by eight-ſided points or pyramids; or they are flat, or cubical, or rounded. Whether this difference of form be original, or adventitious, has not been determined. The firſt kind are the beſt and hardeſt; and may therefore have preſerved their original form againſt accidents better than the others, eſpecially than thoſe which are rounded, which are ſaid to be leaſt hard, and conſequently moſt liable to have their forms altered by attrition. Diamonds are ſaid to conſiſt of laminæ or plates, and probably they have ſome uniform texture; becauſe lapidaries find that they may be poliſhed much more eaſily in one than in any other direction. This ſtone becomes luminous in the dark, by expoſure during a certain time to the rays of the ſun; by heating it in a crucible; by plunging it in boiling water; or by rubbing it with a piece of glaſs. By friction it acquires an electrical property, by which it attracts the ſubſtance uſed for foils, called *black maſtic*, and other light matters. The author of the Chemical Dictionary ſays, that diamonds are refractory in the fire, and even apyrous. Nevertheleſs, experiments have been made, which prove that diamonds are capable of being diſſipated, not only by the collected heat of the ſun, but alſo by the heat of a furnace. Mr Boyle ſays, that he perceived certain acrid and penetrating exhalations from diamonds expoſed to fire. A diamond by expoſure to a concave ſpeculum, the diameter of which was 40 inches, was reduced to an eighth part of its weight *. In the *Giornale de Letterati d' Italia, tom.* viii. *art.* 9. we may read a relation of experiments made on precious ſtones, by order of the grand duke of Tuſcany, with a burning lens, the diameter of which was two thirds of a Florentine ell, near the focus of which was placed another ſmaller lens. By theſe experiments we find, that diamonds were more altered by ſolar heat than moſt of the other precious ſtones, although not the leaſt appearance of a commencing fuſion was obſervable. A diamond weighing 30 grains, thus expoſed during 30 ſeconds, loſt its colour, luſtre, and tranſparency, and became of an opake white. In five minutes, bubbles appeared on its ſurface; ſoon afterwards it burſt into pieces, which were diſſipated; and the ſmall fragment which remained was capable of being cruſhed into fine powder by the preſſure of the blade of a knife. Neither the addition of glaſs, flints, ſulphur, metals, or ſalt of tartar, prevented this diſſipation of diamonds, or occaſioned any degree of fuſion. By this heat rubies were ſoftened, and loſt ſome of their colour, but preſerved their form and weight. By addition of a third lens, a further degree of fuſion was given to rubies. Even then rubies could not be made to unite with glaſs. By having been expoſed to this heat, the ſurface of the rubies which had ſuffered fuſion, loſt much of their original hardneſs, and were nearly as ſoft as cryſtal. But their internal parts, which had not been fuſed, retained their hardneſs. Emeralds by this heat were rendered white, or of various colours, and ſoon afterwards were fuſed. They were found to have loſt part of their weight, and to be rendered leſs hard and brittle.

Experiments were alſo made by order of the emperor Francis I. on precious ſtones; from which we find, that diamonds were entirely diſſipated by having been expoſed in crucibles to a violent fire of a furnace during 24 hours; while rubies by the ſame heat were not altered in weight, colour, or poliſh. By expoſing diamonds during two hours only at a time, the following alterations produced on them by fire were obſerved. Firſt, they loſt their poliſh; then they were ſplit into thin plates; and, laſtly, totally diſſipated. By the ſame fire, emeralds were fuſed. *See Magaſin de Hambourg, tom.* xviii.

The action of fire on diamonds has, notwithſtanding the above mentioned experiments, been lately doubted in France; and the queſtion has been agitated by ſeveral eminent chemiſts with much intereſt, and numerous experiments have been made which throw ſome light on the ſubject. M. D'Arcet found, not only that diamonds included in porcelain crucibles cloſe, or covered with perforated lids, and expoſed to the long and intenſe heat of a porcelain furnace, were perfectly diſſipated; but alſo, that theſe ſtones could in a few hours be totally volatiliſed with a much inferior degree of heat, by expoſing them in a coppel, under the muffle of an eſſay-furnace. In this latter experiment, he obſerved that the diſſipation was gradual, and that it was effected by a kind of exfoliation. The diſſipation of diamonds expoſed in coppels was confirmed by M. Macquer; who further obſerved, that the diamonds were, before the diſſipation began, rendered, by the fire, brilliant and ſhining, as it were, with a phoſphoric light. In order to determine whether the diſſipation of diamonds was actually effected by their reduction into vapour, or by a combuſtion or other effect of air upon them, Meſſrs Lavoiſier, Macquer, and Cadet, expoſed diamonds to intenſe heat in an earthen retort, during ſeveral hours, but without any other effect than that their poliſh was deſtroyed, and about $\frac{1}{7}$th of their weight diminiſhed. M. Mitouard put diamonds in a tobacco-pipe filled with pounded charcoal and accurately cloſed with lute. He further ſecured the diamonds from acceſs of air or flame, by placing the tobacco-pipe in a crucible, to which another crucible was inverted and carefully luted. The diamonds, thus ſecluded from external air, having been expoſed to the moſt intenſe heat which could be excited in a well conſtructed furnace, were not thereby altered or diminiſhed. M. Mitouard was induced to believe, that the charcoal conduced to the preſervation of diamonds not merely by excluding the air, but by ſome peculiar property, which he ſuppoſes may be the ſame as that by which this ſubſtance defends metals from deſtruction by fire. He was confirmed in his opinion, by obſerving that diamonds were not preſerved from the action of fire by ſurrounding them with powder of chalk and of calcined hartſhorn, and including them in cloſe veſſels, ſo well as when the charcoal had been employed. Some chemiſts even thought that the perfect excluſion of air alone was ſufficient to preſerve diamonds, and doubted whether the balls and crucibles of porcelain employed by M. D'Arcet had excluded the air with ſufficient accuracy. Indeed, in one of M. D'Arcet's own experiments, a diamond included in a ball of porcelain had reſiſted the action of fire. In order to aſcertain this queſtion, M. Cadet expoſed diamonds in covered and luted crucibles to the violent heat of a forge during two hours; by which operation the diamonds loſt only $\frac{1}{18}$th part of their weight. He infers, that the deſtruction of diamonds by fire in open veſſels is not a true volatilization; but merely an exfoliation, cauſed by the fire expanding the air contained between the thin plates of which theſe ſtones, conſiſt and that by this exfoliation or decrepitation theſe plates are reduced to ſo fine a powder as to eſcape obſervation. M. D'Arcet objected againſt the experiments of his adverſaries, that they were not of ſufficient duration to decide againſt his, which had laſted ſeveral days. He renewed and multiplied his experiments, which confirmed him in his opinion of the volatiliſation of diamonds in veſſels perfectly cloſed; and that this effect of fire on diamonds is not a mere exfoliation or mechanical ſeparation of the plates of which theſe ſtones conſiſt, he infers from the parts of the diamonds pervading the moſt ſolid porcelain crucibles without being perceptible, and from the luminous appearance firſt noticed by M. Macquer, and which was afterwards obſerved by M. Roux to be an actual flame.

Diamonds are found only in the Eaſt Indies, and in Braſil in South America; but the Oriental diamonds are preferable to the Braſilian ones. The diamond mines are found only in the kingdoms of Golconda,

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* Philoſ. Tranſac. n° 386.

Viſapour, Bengal, and the Iſland of Borneo. There are four mines, or rather two mines and two rivers, whence diamonds are drawn. The mines are, 1. That of Raolconda, in the province of Carnatica, five days journey from Golconda, and eight from Viſapour. It has been diſcovered about 200 years. 2. That of Gani, or Coulour, ſeven days journey from Golconda eaſtwardly. It was diſcovered 140 years ago by a peaſant, who digging in the ground found a natural fragment of 25 caracts. 3. That of Soumelpour, a large town in the kingdom of Bengal, near the Diamond-mine. This is the moſt ancient of them all: it ſhould rather be called that of *Goual*, which is the name of the river, in the ſand whereof theſe ſtones are found. Laſtly, the fourth mine, or rather the ſecond river, is that of Succudan, in the iſland of Borneo.

Diamond-*Mine* of Raolconda.—In the neighbourhood of this mine the earth is ſandy, and full of rocks and copſe. In theſe rocks are found ſeveral little veins of half and ſometimes a whole inch broad, out of which the miners, with a kind of hooked irons, draw the ſand, or earth, wherein the diamonds are; breaking the rocks when the vein terminates, that the track may be found again, and continued. When a ſufficient quantity of earth or ſand is drawn forth, they waſh it two or three times, to ſeparate the ſtones therefrom. The miners work quite naked, except for a thin linen cloth before them; and beſides this precaution, have likewiſe inſpectors, to prevent their concealing of ſtones: which, however, maugre all this care, they frequently find means to do, by watching opportunities when they are not obſerved, and ſwallowing them down.

Diamond-*Mine* of Gani or Coulour.—In this mine are found a great number of ſtones from 10 to 40 caracts, and even more; and it was here that famous diamond of Aureng-Zeb the Great Mogul, which before it was cut weighed 793 caracts, was found. The ſtones of this mine are not very clear; their water is uſually tinged with the quality of the ſoil; being black where that is marſhy, red where it partakes of red, ſometimes green and yellow, if the ground happen to be of thoſe colours. Another defect of ſome conſequence is a kind of greaſineſs appearing on the diamond, when cut, which takes off part of its luſtre. —There are uſually no leſs than 60,000 perſons, men, women, and children, at work in this mine.

When the miners have found a place where they intend to dig, they level another ſomewhat bigger in the neighbourhood thereof, and incloſe it with walls about two foot high, only leaving apertures from ſpace to ſpace, to give paſſage to the water. After a few ſuperſtitious ceremonies, and a kind of feaſt which the maſter of the mine makes for the workmen, to encourage them, every one goes to his buſineſs, the men digging the earth in the place firſt diſcovered, and the women and children carrying it off into the other walled round. They dig 12 or 14 foot deep, and till ſuch time as they find water. Then they ceaſe digging; and the water thus found ſerves to waſh the earth two or three times, after which it is let out at an aperture reſerved for that end. This earth being well waſhed, and well dried, they ſiſt it in a kind of open ſieve, or riddle, much as we do corn in Europe; then thraſh it, and ſiſt it afreſh; and laſtly, ſearch it well with the hands to find the diamonds. They work naked as in the mine of Raolconda, and are watched after the like manner by inſpectors.

Diamond-*Mine* of Soumelpour, or river Goual.—Soumelpour is a large town built all of earth, and covered with branches of cacao-trees: the river Goual runs by the foot thereof, in its paſſing from the high mountains towards the ſouth to the Ganges, where it loſes its name. It is from this river that all our fine diamond points, or ſparks, called *natural ſparks*, are brought. They never begin to ſeek for diamonds in this river till after the great rains are over, that is, after the month of December; and they uſually even wait till the water is grown clear, which is not before January. The ſeaſon at hand, eight or ten thouſand perſons, of all ages and ſexes, come out of Soumelpour and the neighbouring villages. The moſt experienced among them ſearch and examine the ſand of the river, going up it from Soumelpour to the very mountain whence it ſprings. A great ſign that there are diamonds in it, is the finding of thoſe ſtones which the Europeans call *thunder-ſtones*. When all the ſand of the river, which at that time is very low, has been well examined, they proceed to take up that wherein they judge diamonds likely to be found; which is done after the following manner: They dam the place round with ſtones, earth, and faſcines, and lading out the water, dig about two foot deep: the ſand thus got is carried into a place walled round on the bank of the river. The reſt is performed after the ſame manner as at Coulour, and the workmen are watched with equal ſtrictneſs.

Diamond-*Mine* in the iſland of Borneo, or river of Succudan.—We are but little acquainted with this mine; the queen who reigns in that part of the iſland not allowing ſtrangers to have any commerce in theſe ſtones: though there are very fine ones to be bought at Batavia, brought thither by ſtealth. They were anciently imagined to be ſofter than thoſe of the other mines; but experience ſhews, they are in no reſpect inferior to them.

Beſide theſe four diamond-mines, there have been two others diſcovered; one of them between Coulour and Raolconda, and the other in the province of Carnatica; but they were both cloſed up almoſt as ſoon as diſcovered: that of Carnatica, becauſe the water of the diamonds was always either black, or yellow; and the other, on account of their cracking, and flying in pieces when cut and ground.

The diamond, we have already obſerved, is the hardeſt of all precious ſtones. It can only be cut and ground by itſelf and its own ſubſtance. To bring it to that perfection which augments its price ſo conſiderably, they begin by rubbing ſeveral againſt each other, while rough; after having firſt glued them to the ends of two wooden blocks, thick enough to be held in the hand. It is this powder thus rubbed off the ſtones, and received in a little box for the purpoſe, that ſerves to grind and poliſh the ſtones.

Diamonds are cut and poliſhed by means of a mill, which turns a wheel of ſoft iron ſprinkled over with diamond-duſt mixed with oil of olives. The ſame duſt, well ground, and diluted with water and vinegar, is uſed in the ſawing of diamonds; which is performed with an iron or braſs wire, as fine as a hair. Sometimes, in lieu of ſawing the diamonds, they cleave them, eſpecially if there be any large ſhivers therein. But the Europeans are not uſually daring or expert enough to run the riſque of cleaving, for fear of breaking.

The fineſt diamonds are thoſe of a complexion like that of a drop of pure water. It is likewiſe a valuable property if they are of a regular form and truely made; as alſo, that they be free from ſtains, ſpots, ſpecks, flaws, and croſs veins. If diamonds are tinctured yellow, blue, green, or red, in a high degree, they are next in eſteem; but if they are tinctured with theſe colours only in a low degree, the value of them is greatly diminiſhed. There are alſo diamonds of other complexions; ſuch as brown, and thoſe of a dark hue: the firſt reſembling the browneſt ſugar-candy, and the latter duſky iron. In the *Philoſophical Commerce of Arts*, Dr Lewis tells us of a *black* diamond that he himſelf had ſeen. At a diſtance, it looked uniformly black; but, on cloſer examination, appeared in ſome parts tranſparent, and in others charged with foulneſs, on which the black hue depended.

The *firſt water* in diamonds means the greateſt purity and perfection of their complexion, which ought to be that of the pureſt water. When diamonds fall ſhort of this perfection, they are ſaid to be of the *ſecond* or *third* water, &c. till the ſtone may be properly called a *coloured one:* for it would be an impropriety to ſpeak of an imperfectly coloured diamond, or one that has other defects, as a ſtone of a bad water only.

Mr Boyle has obſerved, from a perſon much converſant in diamonds, that ſome of theſe gems, in their rough ſtate, were much heavier than others of the ſame bigneſs, eſpecially if they were cloudy or foul; and Mr Boyle mentions one that weighed $8\frac{1}{2}$ grains, which, being carefully weighed in water, proved to an equal bulk of that liquor as $2\frac{22}{23}$ to 1. So that, as far as could be judged by that experiment, a diamond weighs not thrice as much as water: and yet, in his table of ſpecific gravities, that of a diamond is ſaid to be to water as 3400 to 1000; that is, as $3\frac{2}{5}$ to 1; and therefore, according to theſe two accounts, there ſhould be ſome diamonds whoſe ſpecific gravity differs nearly $\frac{1}{8}$ from that of others. But this is a much greater difference than can be expected in two bodies of the ſame ſpecies; and indeed, on an accurate trial, does not prove to be the caſe with diamonds. The Braſil diamonds differ a little in weight one from another, and greatly vary from the ſtandard ſet by Mr Boyle for the ſpecific gravity of this gem in general; two large diamonds from that part of the world being carefully weighed, one was found as 3518, the other as 3521, the ſpecific gravity of water being reckoned 1000. After this, ten Eaſt India diamonds were choſen out of a large parcel, each as different from the other in ſhape, colour, &c. as could be found. Theſe being weighed in the ſame ſcales and water with the former, the lighteſt proved as 3512, the heavieſt as 3525, ſtill ſuppoſing the water to be 1000.—Mr Ellicot, who made theſe experiments, has drawn out a table of their ſeveral differences, which is done with great care and accuracy; and, taking in all the common varieties in diamonds, may ſerve as a general rule for their mean gravity and differences.

	In air.	In water.	Specific gravity.
Water - - - -	-		1000
	Grains.	*Grains.*	
Nº 1. A Brazil diamond, fine water, and rough coat	92,425	66,16	3518
2. Ditto, fine water, rough coat - -	88,21	63,16	3521
3. Ditto, fine bright coat	10,025	7,170	3511
4. Ditto, fine bright coat	9,560	6,830	3501
5. An Eaſt India diamond, pale blue - -	26,485	18,945	3512
6. Ditto, bright yellow -	23,33	16,710	3524
7. Ditto, very fine water, bright coat - -	20,66	14,800	3525
8. Ditto, very bad water, honeycomb coat -	20,38	14,590	3519
9. Ditto, very hard bluiſh caſt	22,5	16,1	3515
10. Ditto, very ſoft, good water - -	22,615	16,2	3525
11. Ditto, a very large red foulneſs in it - -	25,480	18,230	3514
12. Ditto, ſoft, bad water	29,525	21,140	3521
13. Ditto, ſoft, brown coat	26,535	18,990	3516
14. Ditto, very deep green coat - -	25,250	18,080	3521

The mean ſpecific gravity of the Braſil diamonds appears to be - - - -	3513
Of the Eaſt India diamonds - - - -	3519
The mean of both - - - - -	3517

Therefore if any thing is to be concluded as to the ſpecific gravity of the diamond, it is, that it is to water as 3517 to 1000.

For the valuation of diamonds of all weights, Mr Jefferies lays down the following rule. He firſt ſuppoſes the value of a rough diamond to be ſettled at 2l. per carat, at a medium; then to find the value of diamonds of greater weights, multiply the ſquare of their weight by 2, and the product is the value required. *E. G.* to find the value of a rough diamond of two carats; $2\times2=4$, the ſquare of the weight; which, multiplied by two, gives 8 l. the true value of a rough diamond of two carats. For finding the value of manufactured diamonds, he ſuppoſes half their weight to be loſt in manufacturing them; and therefore, to find their value, we muſt multiply the ſquare of double their weight by 2, which will give their true value in pounds. Thus, to find the value of a wrought diamond weighing two carats; we firſt find the ſquare of double the weight, *viz.* $4\times4=16$; then $16\times2=32$. So that the true value of a wrought diamond of two carats is 32l.—On theſe principles Mr Jefferies has conſtructed tables of the price of diamonds from 1 to 100 carats.

Diamonds are commonly found but of very ſmall ſizes. The largeſt ever ſeen was brought from Braſil, and is in the poſſeſſion of the king of Portugal. It weighs $12\frac{1}{2}$ ounces, and has been valued at upwards of 50 millions ſterling. By ſome ſkilful lapidaries, however, this ſtone is only reckoned to be a topaz; in which caſe, its value muſt be prodigiouſly diminiſhed. The largeſt oriental diamond in the world belongs to the great Mogul. It weighs 279 carats. According to the computation of M. Tavernier, this diamond is worth 779,244 l. Ster. but by the tables of Mr Jefferies abovementioned,

mentioned, its value is only 624,962 l.

Brilliant Diamond, is that cut in faces both at top and bottom; and whoſe table, or principal face at top, is flat. To make a complete ſquare brilliant, if the rough diamond be not found of a ſquare figure, it muſt be made ſo; and if the work is perfectly executed, the length of the axis will be equal to the ſide of the ſquare baſe of the pyramid.—Jewellers then form the table and collet by dividing the block, or length of the axis, into 18 parts. They take $\frac{5}{18}$ from the upper part, and $\frac{1}{18}$ from the lower. This gives a plane at $\frac{4}{18}$ diſtance from the girdle for the table; and a ſmaller plane at $\frac{5}{18}$ diſtance for the collet; the breadth of which will be $\frac{1}{5}$ of the breadth of the table. In this ſtate the ſtone is ſaid to be a *complete ſquare table* diamond.—The brilliant is an improvement on the table-diamond, and was introduced within the laſt century, according to Mr Jefferies.—To render a brilliant perfect, each corner of the above deſcribed table-diamond muſt be ſhortened by $\frac{1}{20}$ of its original. The corner ribs of the upper ſides muſt be flattened, or run towards the centre of the table $\frac{1}{6}$ leſs than the ſides; the lower part, which terminates in the girdle, muſt be $\frac{1}{8}$ of one ſide of the girdle; and each corner rib of the under ſides muſt be flattened at the top, to anſwer the above flattening at the girdle, and at bottom muſt be $\frac{1}{4}$ of each ſide of the collet.

The parts of the ſmall work which completes the brilliant, or the ſtar and ſkill facets, are of a triangular figure. Both of theſe partake equally of the depth of the upper ſides from the table to the girdle; and meet in the middle of each ſide of the table and girdle, as alſo at the corners. Thus they produce regular lozenges on the four upper ſides and corners of the ſtone. The triangular facets, on the under ſides, joining to the girdle, muſt be half as deep again as the above facets, to anſwer to the collet part.—The ſtone here deſcribed is ſaid to be a *full-ſubſtanced brilliant*.—If the ſtone is thicker than in the proportion here mentioned, it is ſaid to be an *over-weighted brilliant*.—If the thickneſs is leſs than in this proportion, it is called a *ſpread-brilliant*.—The beauty of brilliants is diminiſhed from their being either over-weighted or ſpread. The true proportion of the axis, or depth of the ſtone to its ſide, is as 2 to 3.—Brilliants are diſtinguiſhed into ſquare, round, oval, and drops, from the figure of their reſpective girdles.

Corniſh Diamond, a name given by many people to the cryſtals found in digging the mines of tin in Cornwal. Theſe cryſtals are of the nature of the Kerry-ſtone of Ireland, but ſomewhat inferior to it: they are uſually bright and clear, except towards the root, where they are coarſe and foul, or whitiſh. They are uſually found in the common form of an hexangular column terminated at each end by a hexangular pyramid.

Roſe-Diamond is one that is quite flat underneath, with its upper part cut in divers little faces, uſually triangles, the uppermoſt of which terminate in a point.—In roſe-diamonds, the depth of the ſtone from the baſe to the point muſt be half the breadth of the diameter of the baſe of the ſtone. The diameter of the crown muſt be $\frac{2}{5}$ of the diameter of the baſe. The perpendicular, from the baſe to the crown, muſt be $\frac{3}{5}$ of the diameter of the ſtone. The lozenges which appear in all circular roſe-diamonds, will be equally divided by the ribs that form the crown; and the upper angles or facets will terminate in the extreme point of the ſtone, and the lower in the baſe or girdle.

Rough Diamond, is the ſtone as nature produces it in the mines.

A rough diamond muſt be choſen uniform, of a good ſhape, tranſparent, not quite white, and free of flaws and ſhivers. Black, rugged, dirty, flawey, veiny ſtones, and all ſuch as are not fit for cutting, they uſe to pound in a ſteel mortar made for that purpoſe; and when pulverized, they ſerve to ſaw, cut, and poliſh the reſt. Shivers are occaſioned in diamonds by this, That the miners, to get them more eaſily out of the vein, which winds between two rocks, break the rocks with huge iron levers, which ſhakes, and fills the ſtone with cracks and ſhivers. The ancients had two miſtaken notions with regard to the diamond: the firſt, that it became ſoft, by ſteeping it in hot goat's blood; and the ſecond, that it is malleable, and bears the hammer. Experience ſhews us the contrary; there being nothing capable of mollifying the hardneſs of this ſtone; though its hardneſs be not ſuch, that it will endure being ſtruck at pleaſure with the hammer.

Table-Diamond. See *Brilliant* Diamond.

Diamond, in the glaſs-trade, an inſtrument uſed for ſquaring the large plates or pieces; and, among glaziers, for cutting their glaſs.

Theſe ſort of diamonds are differently fitted up. That uſed for large pieces, as looking-glaſſes, &c. is ſet in an iron ferril, about two inches long, and a quarter of an inch in diameter; the cavity of the ferril being filled up with lead, to keep the diamond firm: there is alſo a handle of box, or ebony, fitted to the ferril, for holding it by.

Diamond, in heraldry, a term uſed for expreſſing the black colour in the atchievements of peerage.

Guillim does not approve of blazoning the coats of peers by precious ſtones inſtead of metals and colours; but the Engliſh practice allows it. Morgan ſays the diamond is an emblem of fortitude.

DIANA, the goddeſs of hunting, in heathen mythology, was the daughter of Jupiter and Latona. She is called Hecate in hell, Diana on earth, and Phœbe in heaven. She was famous for her chaſtity. Her temple at Epheſus was one of the ſeven wonders of the world. It was burnt the ſame day that Alexander the Great was born, by Eroſtratus, from no other motive but to perpetuate his name.

DIANÆ arbor, or Arbor Lunæ, in chemiſtry, the beautiful cryſtallizations of ſilver, diſſolved in aqua fortis, to which ſome quickſilver is added: and ſo called from their reſembling the trunk, branches, leaves, &c. of a tree. See Chemistry, n° 198.

DIANDRIA, (from δις, *twice*, and ανηρ, *a man*) the name of the ſecond claſs in Linnæus's ſexual ſyſtem, conſiſting of hermaphrodite plants; which, as the name imports, have flowers with two *ſtamina* or male organs.

The orders in this claſs are three, derived from the number of ſtyles or female parts. Moſt plants with two ſtamina have one ſtyle; as jeſſamy, lilac, privet, veronica, and baſtard alaternus: vernal graſs has two ſtyles; pepper, three.

DIANTHERA, in botany, a genus of the monogynia,

gynia order, belonging to the diandria claſs of plants, for which there is no Engliſh name.—There is only one ſpecies, a native of Virginia and other parts of North America. It is a low herbaceous plant, with a perennial root, ſending out upright ſtalks a foot high, garniſhed with long narrow leaves of an aromatic odour, ſtanding cloſe to the ſtalks; from the ſide of the ſtalks the footſtalks of the flowers are produced, ſuſtaining ſmall ſpikes of flowers.—This plant is very difficult to be preſerved in Britain; for though it is hardy enough to live in the open air, it is very ſubject to rot in winter. It may be propagated by ſeeds ſown on a gentle hotbed; and in the winter the plants muſt be kept in a dry ſtove.

DIANTHUS, CLOVE-GILLIFLOWER, CARNATION, PINK, SWEET-WILLIAM, &c.; a genus of the digynia order, belonging to the decandria claſs of plants.—There are a great number of ſpecies; but not more than four that have any conſiderable beauty as garden-flowers, each of which furniſhes ſome beautiful varieties. 1. The caryophyllus, or clove-gilliflower, including all the varieties of carnation. It riſes with many ſhort trailing ſhoots from the root, garniſhed with long, very narrow, evergreen leaves; and amidſt them upright ſlender flower-ſtalks, from one to three feet high, emitting many ſide-ſhoots; all of which, as well as the main ſtalk, are terminated by large ſolitary flowers, having ſhort oval ſcales to the calix, and crenated petals. The varieties of this are very numerous, and unlimited in the diverſity of flowers. 2. The deltoides, or common pink, riſes with numerous ſhort leafy ſhoots crowning the root, in a tufted head cloſe to the ground, cloſely garniſhed with ſmall narrow leaves; and from the ends of the ſhoots, many erect flower-ſtalks from about 6 to 15 inches high, terminated by ſolitary flowers of different colours, ſingle and double, and ſometimes finely variegated. This ſpecies is perennial, as all the varieties of it, commonly cultivated, alſo are. 3. The Chinenſis, Chineſe, or Indian pink, is an annual plant with upright firm flower-ſtalks, branching erect on every ſide, a foot or 15 inches high, having all the branches terminated by ſolitary flowers of different colours and variegations, appearing from July to November. 4. The barbatus, or bearded dianthus, commonly called *ſweet-william*. This riſes with many thick leafy ſhoots, crowning the root in a cluſter cloſe to the ground; garniſhed with ſpear-ſhaped evergreen leaves, from half an inch to two inches broad. The ſtems are upright and firm, branching erect two or three feet high, having all the branches and main ſtem crowned by numerous flowers in aggregate cluſters of different colours and variegations.

Culture. Though the carnations grow freely in almoſt any garden earth, and in it produce beautiful flowers, yet they are generally ſuperior in that of a light loamy nature: and of this kind of ſoil the floriſts generally prepare a kind of compoſt in the following manner, eſpecially for thoſe fine varieties which they keep in pots. A quantity of loamy earth muſt be provided, of a light ſandy temperature, from an upland or dry paſture-field or common, taking the top ſpit turf and all, which muſt be laid in a heap for a year, and turned over frequently. It muſt then be mixed with about one third of rotten dung of old hotbeds, or rotten neats dung, and a little ſea-ſand, forming the whole into a heap again, to lie three, four, or ſix months, at which time it will be excellent for uſe; and if one parcel or heap was mixed with one of theſe kinds of dungs, and another parcel with the other, it will make a change, and may be found very beneficial in promoting the ſize of the flowers. This compoſt, or any other made uſe of for the purpoſe, ſhould not be ſifted, but only well broken with the ſpade and hands.—When great quantities of carnations are required, either to furniſh large grounds, or for market, or when it is intended to raiſe new varieties, it is eaſily effected by ſowing ſome ſeed annually in ſpring, in common earth, from which the plants will riſe abundantly. Several good varieties may alſo be expected from the plants of each ſowing; and poſſibly not one exactly like thoſe from which the ſeed was ſaved. The ſingle flowers are always more numerous than the double ones; but it is from the latter only that we are to ſelect our varieties. The ſeaſon for ſowing the ſeed, is any time from the 20th of March to the 15th of April.—The plants generally come up in a month after ſowing: they muſt be occaſionally weeded and watered till July, when they will be fit for tranſplanting into the nurſery beds. Theſe beds muſt be made about three feet wide, in an open ſituation; and taking advantage of moiſt weather, prick the plants therein four inches aſunder, and finiſh with a gentle watering, which repeat occaſionally till the plants have taken good root. Here they muſt remain till September, when they will be ſo well advanced in growth as to require more room; and ſhould then have their final tranſplantation into other three feet wide beds of good earth, in rows 9 inches aſunder, where they are to be placed in the order of quincunx. Here they are to remain all winter, until they flower, and have obtained an increaſe of the approved varieties of doubles by layers; and until this period, all the culture they require is, that if the winter ſhould prove very ſevere, an occaſional ſhelter of mats will be of advantage. In ſpring, the ground muſt be looſened with a hoe; they muſt be kept clear from weeds; and when the flower-ſtalks advance, they are to be tied up to ſticks, eſpecially all thoſe that promiſe by their large flower-pods to be doubles.

The only certain method of propagating the double varieties is by layers. The proper parts for layers are thoſe leafy ſhoots ariſing near the crown of the root, which, when about five, ſix, or eight inches long, are of a proper degree of growth for layers. The general ſeaſon for this work is June, July, and the beginning of Auguſt, as then the ſhoots will be arrived at a proper growth for that operation; and the ſooner it is done after the ſhoots are ready, the better, that they may have ſufficient time to acquire ſtrength before winter: thoſe laid in June and July will be fit to take off in Auguſt and September, ſo will form fine plants in the month of October. The method of performing the work is as follows.—Firſt provide a quantity of ſmall hooked ſticks for pegs. They muſt be three or four inches long, and their uſe is to peg the layers down to the ground. Get ready alſo in a barrow a quantity of light, rich mould, to raiſe the earth, if neceſſary, round each plant, and provide alſo a ſharp penknife. The work is begun by ſtripping off all the leaves from the body of the ſhoots, and ſhortening thoſe at top an inch or two evenly. Then chooſing a ſtrong joint on the middle of the ſhoot or thereabouts, and on the back or under ſide thereof, cut with the penknife the joint half-way through, directing your knife upward ſo as to ſlit the joint up the middle, almoſt to the next joint above, by which you form a kind of tongue on the back of the ſhoot; obſerving that the ſwelling ſkinny part of the joint remaining at the bottom of the tongue muſt be trimmed off, that nothing may obſtruct the iſſuing of the fibres; for the layers always form their roots at that part. This done, looſen the earth about the plant; and, if neceſſary, add ſome freſh mould, to raiſe it for the more ready reception of the layers; then with your finger make a hollow or drill in the earth to receive the layer; which, bend horizontally into the opening, raiſing the top upright, ſo as to keep the gaſh or ſlit part of the layer open; and, with one of the hooked ſticks, peg down the body of the layer, to ſecure it in its proper place and poſition, ſtill preſerving the top erect, and the ſlit open, and draw the earth over it an inch or two, bringing it cloſe about the erect part of the ſhoot; and when all the ſhoots of each plant are thus laid, give directly ſome water to ſettle the earth cloſe, and the work is finiſhed. In dry weather the waterings muſt be often repeated, and in five or ſix weeks the layers will have formed good roots. They muſt then be ſeparated with a knife from the old plant, gently raiſed out of the earth with the point of a knife or trowel in order to preſerve the fibrous roots of the layers as entire as poſſible; and when thus taken up, cut off the naked ſticky part at bottom cloſe to the root, and trim the tops of the leaves a little. They are then ready for planting either into beds or pots. In November the fine varieties in pots ſhould be moved to a ſunny, ſheltered, ſituation for the winter; and if placed in a frame, to have occaſional protection from hard froſt, it will be of much advantage. In the latter end of February, or ſome time in March, the layers in the ſmall pots, or ſuch as are in beds, ſhould be tranſplanted with balls into the large pots, where they are to remain for flower. To have as large flowers as poſſible, curious floriſts clear off all ſide-ſhoots from the flower-ſtem, ſuffering only the main or top buds to remain for flowering. When the flowers begin to open, attendance ſhould be given to aſſiſt the fine varieties, to promote their regular expanſion, particularly the largeſt kinds called *burſters*, whoſe flowers are ſometimes three or four inches diameter. Unleſs theſe are aſſiſted by art, they are apt to burſt open on one ſide, in which caſe the flower will become very irregular: therefore, attending every day at that period, obſerve, as ſoon as the calix begins to break, to cut it a little open, at two other places in the indenting at top with narrow-pointed ſciſſars, and hereby the more regular expanſion of the petals will be promoted; obſerving, if one ſide of any flower comes out faſter than another, to turn the pot about, that the other ſide of the flower may be next the ſun, which will alſo greatly promote its regular expanſion. When any fine flower is to be blown as large and ſpreading as poſſible, floriſts place ſpreading paper collars round the bottom of the flowers, on which they may ſpread their petals to the utmoſt expanſion. Theſe collars are made of ſtiff, white paper, cut circular, about three or four inches over, having a hole in the middle to receive the bottom of the flower, and one ſide cut open to admit it. This is to be placed round the bottom of the petals in the inſide of the calix, the leaves of which are made to ſpread flat for its ſupport: the petals muſt then be drawn out and ſpread upon the collar to their full width and extent; the longeſt ones undermoſt, and the next longeſt upon theſe; and ſo on; obſerving that the collar muſt no where appear wider than the flower; and thus a carnation may be rendered very large and handſome.

Theſe directions will anſwer equally well for the propagation of the pinks and ſweet-williams, tho' neither of theſe require ſuch nicety in their culture as the carnations.

DIAPASON, in muſic, a muſical interval, by which moſt authors who have wrote on the theory of muſic, uſe to expreſs the OCTAVE of the Greeks.

Diapason, among the muſical inſtrument-makers, a kind of rule or ſcale whereby they adjuſt the pipes of their organs, and cut the holes in their hautboys, flutes, &c. in due proportion for performing the tones, ſemitones, and concords, juſt.

Diapason-*Diaex*, in muſic, a kind of compound concord, whereof there are two ſorts; the greater, which is in the proportion of 10-3; and the leſſer, in that of 16-5.

Diapason *Diapente*, in muſic, a compound conſonance in a triple ratio, as 3-9. This interval, ſays Martianus Capella, conſiſts of 9 tones and a ſemitone; 19 ſemitones, and 38 dieſes. It is a ſymphony made when the voice proceeds from the firſt to the twelfth ſound.

Diapason *Diateſſaron*, in muſic, a compound concord founded on the proportion of 8 to 3. To this interval Martianus Capella allows 8 tones and a ſemitone; 17 ſemitones, and 34 dieſes. This is when the voice proceeds from its firſt to its eleventh ſound. The moderns would rather call it the *eleventh*.

Diapason *Ditone*, in muſic, a compound concord, whoſe terms are as 10-4, or as 5-2.

Diapason *Semiditone*, in muſic, a compound concord, whoſe terms are in the proportion of 12-5.

DIAPEDESIS, in medicine, a tranſudation of the fluids through the ſides of the veſſels that contain them, occaſioned by the blood's becoming too much attenuated, or the pores becoming too patent.

DIAPENTE, in the ancient muſic, an interval marking the ſecond of the concords, and with the diateſſaron an octave. This is what in the modern muſic is called a *fifth*.

DIAPHANOUS, an appellation given to all tranſparent bodies, or ſuch as tranſmit the rays of light *.

DIAPHORESIS, in medicine, an elimination of the humours in any part of the body thro' the pores of the ſkin. See Perspiration.

DIAPHORETICS, among phyſicians, all medicines which promote perſpiration.

DIAPHRAGM. See Anatomy, n° 370.

DIAPORESIS, a figure in oratory, expreſſing the uncertainty of the ſpeaker how he ſhall proceed in his diſcourſe.

DIARBECK, or Diarbeker, the modern name of the province of Mesopotamia in Turky in Aſia.

DIARRHOEA, or Looseness, in medicine, is a frequent and copious evacuation of liquid excrement by ſtool. See (the *Index* ſubjoined to) Medicine.

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* See *Optics*.

DIARTHROSIS. See ANATOMY, n° 2. c.

DIARY, among traders, denotes a day-book, containing the proceedings of one day.

DIACHISM, among muſicians, denotes the difference between the comma and enharmonic dieſis, commonly called the *leſſer comma*.

DIASCORDIUM, in pharmacy, a celebrated compoſition, ſo called from *ſcordium*, one of its ingredients. See PHARMACY, n° 888.

DIASTOLE, among phyſicians, ſignifies the dilatation of the heart, auricles, and arteries; and ſtands oppoſed to the SYSTOLE, or contraction of the ſame parts. See ANATOMY, n° 388.

DIASTOLE, in grammar, a figure in proſody whereby a ſyllable naturally ſhort is made long. Such is the firſt ſyllable of *Priamides* in the following verſe of Virgil: *Atque hic Priamides! nihil o tibi, amice, relictum.*

DIASYRMUS, in rhetoric, a kind of hyperbole, being an exaggeration of ſome low, ridiculous thing.

DIATESSARON, among ancient muſicians, a concord, or harmonical interval, compoſed of a greater tone, a leſs tone, and one greater ſemitone: its proportion in numbers is as 4 : 3.

DIATONICK, in muſic, (compounded of two Greek words, *viz.* the prepoſition δια, ſignifying a tranſition from one thing to another, and the ſubſtantive τονος, importing a given degree of tenſion or muſical note), is indifferently applied to a ſcale or gammut, to intervals of a certain kind, or to a ſpecies of muſic, whether in melody or harmony, compoſed of theſe intervals. Thus we ſay the *diatonick* ſeries, a *diatonick* interval, *diatonick* melody or harmony. As the diatonick ſcale forms the ſyſtem of diatonick muſic, and conſiſts of diatonick intervals, it will be neceſſary, for underſtanding the former, that we ſhould explain the latter. See INTERVAL.

DIATRAGACANTH, in pharmacy, a name applied to certain powders, of which gum tragacanth is the chief ingredient. See PHARMACY, n° 825. b.

DIAUGOPHRAGMIA, in natural hiſtory, a genus of foſſils of the order of ſeptariæ, whoſe partitions, or ſepta, conſiſt of ſpar with an admixture of cryſtal. Of this genus there are three ſpecies. 1. A red kind, with browniſh yellow partitions. 2. A browniſh yellow kind, with whitiſh partitions. 3. A bluiſh-white kind, with ſtraw-coloured partitions.

DIBBLE, or DIBBER, a ſimple but uſeful implement in gardening, uſed for planting out all ſorts of young plants, &c.

DIBBLING WHEAT. See WHEAT.

DICE, among gameſters, certain cubical pieces of bone or ivory, marked with dots on each of their faces, from one to ſix, according to the number of faces.

Sharpers have ſeveral ways of falſifying dice. 1. By ſticking a hog's briſtle in them, ſo as to make them run high or low, as they pleaſe. 2. By drilling, and loading them with quickſilver: which cheat is found out by holding them gently by two diagonal corners; for if falſe, the heavy ſides will turn always down. 3. By filing and rounding them. But all theſe ways fall far ſhort of the art of the dice-makers; ſome of whom are ſo dexterous this way, that your ſharping gameſters will give any money for them.

Dice formerly paid 5 s. every pair imported, with an additional duty of 4 s. 9$\frac{45}{100}$ d. for every 20 s. value upon oath; but are now prohibited to be imported.

DICÆARCHUS, a ſcholar of Ariſtotle, compoſed a great number of books which were much eſteemed. Cicero and his friend Pomponius Atticus valued him highly. He wrote a book to prove, that men ſuffer more miſchief from one another, than from all evils beſide. And the work he compoſed concerning the republic of Lacedæmon was extremely honoured, and read every year before the youth in the aſſembly of the ephori. Geography was one of his principal ſtudies, on which ſcience there is a fragment of a treatiſe of his ſtill extant, and preſerved among the *Veteris geographiæ ſcriptores minores*.

DICHOTOMY, a term uſed by aſtronomers for that phaſis or appearance of the moon, wherein ſhe is biſected, or ſhews juſt half her diſk. In this ſituation the moon is ſaid to be in a quadrate aſpect, or to be in her quadrature.

DICHOTOMY, in botany. See BOTANY, p. 1298.

DICKER, in old writers, denotes the quantity of ten hides of ſkins, whereof 20 made a laſt: alſo 10 pair of gloves, ten bars of iron, and the like, are ſometimes expreſſed by the term *dicker*.

DICKINSON (Edmund), a celebrated Engliſh phyſician and chemiſt, born in 1624. He ſtudied and took his degrees at Merton-college, Oxford; and in 1655 publiſhed there his *Delphi Phœnicizantes*, &c. a moſt learned piece, in which he attempted to prove that the Greeks borrowed the ſtory of the Pythian Apollo, and all that rendered the oracle at Delphos famous, from the Holy Scriptures, and the book of Joſhua in particular: a work that procured him great reputation both at home and abroad. He practiſed phyſic firſt at Oxford; but removing to London in 1684, his good fortune in recovering the earl of Arlington from a dangerous ſickneſs, procured his promotion to be phyſician in ordinary to Charles II. and to his houſehold. As that prince underſtood and loved chemiſtry, Dr Dickinſon grew into great favour at court; and was continued in his appointments under James II. After the abdication of his unfortunate maſter, being then in years, and afflicted with the ſtone, he retired from practice, and died in 1707. He publiſhed many other things, particularly *Phyſica vetus & vera*, &c. containing a ſyſtem of philoſophy chiefly framed on principles collected from the Moſaic hiſtory.

DICTAMNUS, WHITE DITTANY, or *Fraxinella*; a genus of the monogynia order, belonging to the decandria claſs of plants. There is only one ſpecies. It hath thick, penetrating, perennial roots, collected into a head at top, ſending up erect ſtalks annually, two or three feet high, garniſhed with pinnated alternate leaves, of three or four pair of oblong ſtiff lobes, terminated by an odd one; and the ſtalks crowned by long, pyramidal, looſe ſpikes of flowers, of white, red, and purple colours. They are very ornamental plants, and ſucceed in any of the common borders. The dittany which grows in Crete, Dalmatia, and the Morea, forms an article in the materia medica. The leaves, which are the only parts uſed, are imported from Italy. The beſt ſort are well covered over with a thick white down, and now and then intermixed with purpliſh flowers. In ſmell and taſte they ſomewhat reſemble lemon-thyme, but have more of an aromatic

matic flower, as well as a greater degree of pungency; when freſh they yield a conſiderable quantity of an excellent eſſential oil.

DICTATOR, in the policy of the ancient Romans, a magiſtrate inveſted with ſovereign and even arbitrary power.

He had power of life and death; alſo to raiſe and diſband troops, make war or peace, and that without the conſent either of the ſenate or people, or being accountable for his proceedings. He was elected by one of the conſuls in the night-time, on the frontiers of the commonwealth, and nowhere elſe; and the ordinary duration of his office was only for ſix months, during which time all other magiſtracies ceaſed, the tribuneſhip excepted. Whenever he appeared in public, he was attended by 24 lictors, or double the number allowed a conſul. However, notwithſtanding all this power, he could not go out of Italy, or even ride on horſeback during a march, without leave from the people.

This office was accounted the ſafeguard of the commonwealth for 400 years together; till Sylla and Cæſar, by aſſuming the title of *perpetual dictators*, converted it into tyranny, and rendered the very name odious.

DICTION, the phraſe, elocution, or ſtyle of a writer or ſpeaker. See ORATORY, n° 99—121.

DICTIONARY, in its original acceptation, is the arranging all the words of a language according to the order of the alphabet, and annexing a definition or explanation to each word. When arts and ſciences began to be improved and extended, the multiplicity of technical terms rendered it neceſſary to compile dictionaries either of ſcience in general, or of particular ſciences, according to the views of the compiler.

DICTIONARY *of the Engliſh Language.* The only attempt which has hitherto been made towards forming a regular dictionary of the Engliſh language, is that of the learned Dr Samuel Johnſon. But altho' it is executed in a maſterly manner, yet as it cannot be expected that an undertaking of this nature could be brought to perfection by one man, we ſhall venture to ſuggeſt a few circumſtances which, if duely attended to, may perhaps be of ſome utility.

The deſign of every dictionary of language, is to explain, in the moſt accurate manner, the meaning of every word; and to ſhow the various ways in which it can be combined with others, in as far as this tends to alter its meaning. The dictionary which does this in the moſt accurate manner, is the moſt complete. Therefore the principal ſtudy of a lexicographer ought to be, to diſcover a method which will be beſt adapted for that purpoſe. Dr Johnſon, with great labour, has collected the various meanings of every word, and quoted the authorities: but, would it not have been an improvement if he had given an accurate definition of the preciſe meaning of every word; pointed out the way in which it ought to be employed with the greateſt propriety; ſhowed the various deviations from that original meaning, which cuſtom had ſo far eſtabliſhed as to render allowable; and fixed the preciſe limits beyond which it could not be employed without becoming a vicious expreſſion? With this view, it would have been neceſſary to exhibit the nice diſtinctions that take place between words which are nearly ſynonymous. Without this, many words can only be defined in ſuch a manner, as that they muſt be conſidered as exactly ſynonymous. We omit giving any quotations from Johnſon, to point out theſe defects; and ſhall content ourſelves with giving a few examples, to ſhow how, according to our idea, a dictionary of the Engliſh language ought to be compiled.

IMMEDIATELY. *adv. of time.*

1. Inſtantly, without delay. Always employed to denote future time, and never paſt. Thus, we may ſay, *I will come immediately*; but not, *I am immediately come from ſuch a place.* See PRESENTLY.
2. Without the intervention of any cauſe or event; as oppoſed to *mediately.*

PRESENTLY. *adv. of time.*

1. Inſtantly, without delay. Exactly ſynonymous with *immediately;* being never with propriety employed to denote any thing but future time.
2. Formerly it was employed to expreſs preſent time. Thus, *The houſe preſently poſſeſſed by ſuch a one,* was often uſed: but this is now become a vicious expreſſion; and we ought to ſay, *The houſe poſſeſſed at preſent.* It differs from *immediately* in this, that even in the moſt corrupt phraſes it never can denote paſt time.

FORM. *ſubſt.* The external appearance of any object, when conſidered only with reſpect to ſhape or figure. This term therefore, in the literal ſenſe, can only be applied to the objects of the ſight and touch; and is nearly ſynonymous with *figure:* but they differ in ſome reſpects. *Form* may be employed to denote more rude and unfiniſhed ſhapes; *figure,* thoſe which are more perfect and regular. *Form* can never be employed without denoting matter; whereas *figure* may be employed in the abſtract: thus, we ſay a ſquare or a triangular *figure;* but not a ſquare or triangular *form.* And in the ſame manner we ſay, the *figure* of a houſe: but we muſt denote the ſubſtance which forms that figure, if we uſe the word *form;* as, *a cloud of the form of a houſe,* &c. See FIGURE.

2. In contraſt to irregularity, or confuſion. As beauty cannot exiſt without order, it is by a figure of ſpeech employed to denote beauty, order, *&c.*
3. As *form* reſpects only the external appearance of bodies, without regard to their internal qualities, it is, by a figure of ſpeech, employed in contraſt to theſe qualities, to denote empty ſhow, without eſſential qualities. In this ſenſe it is often taken when applied to religious ceremonies, &c.
4. As *form* is employed to denote the external appearance of bodies; ſo, in a figurative ſenſe, it is applied to reaſoning, denoting the particular mode or manner in which this is conducted; as, *the form of a ſyllogiſm,* &c.
5. In the ſame manner it is employed to denote the particular mode of procedure eſtabliſhed in courts of law; as, *the forms of law, religion,* &c.
6. *Form* is ſometimes, although improperly, uſed to denote the different circumſtances of the ſame body; as, *water in a fluid or a ſolid form.* But

as this phraſe regards the internal qualities rather than the external figure, it is improper; and ought to be, *water in a fluid or a ſolid ſtate*.

7. But when bodies of different kinds are compared with one another, this term may be employed to denote other circumſtances than ſhape or figure: for we may ſay, *a juice exſuding from a tree in the form of wax or reſin;* although, in this caſe, the conſiſtence, colour, *&c.* and not the external arrangement of parts, conſtitutes the reſemblance.

8. From the regular appearance of a number of perſons arranged in one long ſeat, ſuch perſons ſo arranged are ſometimes called a *form;* as, *a form of ſtudents*, &c. And,

9. By an eaſy tranſition, the ſeat itſelf has alſo acquired that name.

GREAT. *adj.* A relative word, denoting largeneſs of quantity, number, &c. ſerving to augment the value of thoſe terms with which it is combined, and oppoſed to *ſmall* or *little*. The principal circumſtances in which this word can be employed, are the following:

1. When merely *in*animate objects are conſidered with regard to quantity, *great* is with propriety employed, to denote that the quantity is conſiderable; as, *a great mountain*, *a great houſe*, &c. and it is here contraſted with *ſmall*. When *great* is thus employed, we have no other word that is exactly ſynonymous.

2. When *in*animate objects are conſidered with regard to their extent, this term is ſometimes employed, although with leſs propriety; as, *a great plain*, *a great field*, &c. And in this ſenſe it is nearly ſynonymous with *large;* and they are often uſed indiſcriminately, but with ſome difference of meaning: for, as *large* is a term chiefly employed to denote extent of ſuperficies, and as *great* more particularly regards the quantity of matter; therefore, when *large* is applied to any object which is not merely ſuperficial, it denotes that it is the extent of ſurface that is there meant to be conſidered, without regard to the other dimenſions; whereas when the term *great* is employed, it has a reference to the whole contents. If, therefore, we ſay, *a large houſe*, or *a large river*, we expreſs that the houſe, the river, have a ſurface of great extent, without having any neceſſary connection with the ſize in other reſpects. But if we ſay, *a great houſe*, or *a great river*, it at once denotes that they have not only a large ſurface, but are alſo of great ſize in every reſpect.

3. *Great*, when applied to the human ſpecies, never denotes the ſize or largeneſs of body, but is applied ſolely to the qualities of the mind. Thus, when we ſay, that *Socrates was a great man*, we do not mean that he was a man of great ſize, but that he was a man who excelled in the endowments of the mind. The terms which denote largeneſs of ſize in the human body are, *big*, *bulky*, *huge*, &c.

4. *Great* is ſometimes applied to the human ſpecies, as denoting high rank. In this caſe it is oftener uſed in the plural number than otherwiſe. Thus we ſay ſimply, *the great*, meaning the whole body of men in high ſtation, as oppoſed to *mean*. It ſhould ſeldom be employed in this ſenſe, as it tends to confound dignity of rank with elevation of mind.

5. As this is a general term of augmentation, it may be joined with all nouns which denote *quantity*, *quality*, *number*, *excellence*, or *defects;* or ſuch as imply *praiſe*, *blame*, *anger*, *contempt*, or any other affection of the mind.

6. It is employed to denote every ſtep of aſcending or deſcending conſanguinity; as, *great-grandfather*, *great-grandſon*, &c.

HIGH. *adj.* Exalted in a perpendicular direction at a diſtance from the ſurface of the earth. Oppoſed to *low*.

1. *High* is a term altogether indefinite, and is employed to expreſs the degree of elevation of any inanimate body. Thus, we ſay, *a high mountain*, *a high houſe*, *ſteeple*, *tower*, *pillar*, &c. Nor is there any other word that can here be conſidered as ſynonymous; *lofty* being employed only to denote a very eminent degree of elevation.

2. To expreſs the perpendicular elevation of vegetables, either *high* or *tall* may be employed, as being in this caſe nearly ſynonymous. We may therefore ſay, a *high* or *tall tree*, a *high* or *tall maſt*, &c.: but with this difference between theſe two expreſſions, that *tall* can be more properly applied to thoſe that are much elevated and of ſmall dimenſions; and *high*, to ſuch as are more bulky, and of greater ſize.

3. The perpendicular height of man can never be expreſſed by the word *high; tall* being here the proper expreſſion. And altho' *high* is ſometimes uſed to expreſs the height of other animals, yet it ſeems to be an improper expreſſion. See TALL.

4. *High*, when applied to the human ſpecies, always refers to the mind; and denotes *haughtineſs*, *ſtatelineſs*, *pride*, &c.; and, when combined with the expreſſions of any energy of the mind, it denotes that in a higher degree. In this ſenſe, it is oppoſed to *meanneſs*, *abjectneſs*, and *humility*.

5. As this is an indefinite term, tending to denote any thing that is elevated above us, it may be combined with almoſt every noun which admits of this elevation. And as objects high above us are always out of our reach, it is in a metaphorical ſenſe uſed to denote any thing that ſeems to be above the ordinary condition of mankind; or thoſe qualities or endowments of mind that are not eaſily acquired: as, *dignity* or *elevation of ſentiment; dignity of rank; acuteneſs in reaſoningon difficult ſubjects; pride*, *haughtineſs*, or any other quality which ſeems beyond the ordinary level of mankind; *dearneſs of price*, &c.

6. In the ſame manner we apply this term to time; which having a metaphorical reſemblance to a river flowing on with an unceaſing current thro' all ſucceſſive ages, any thing of remote antiquity is denoted by the term *high*.

7. Likewiſe thoſe degrees of latitudes far removed from the line, where the pole becomes more elevated.

8. And to ſome particular crimes, as being at-

tended with peculiar degrees of guilt; as, *high treaſon*.

TALL. *adj.* Something elevated to a conſiderable degree in a perpendicular direction. Oppoſed to *low*.

1. This term is chiefly employed to expreſs the height of man, and other animals; and is applied to denote the height of the body only, without having any reference to the mind. When applied to man, no other word can be ſubſtituted in its ſtead: when applied to other animals, *high* is ſometimes conſidered as nearly ſynonymous. See HIGH.

2. It is likewiſe employed to denote the perpendicular height of vegetables; and in this caſe, it is nearly ſynonymous with *high*. See HIGH.

3. It can in no caſe be employed to expreſs the height of merely inanimate objects; as we can never ſay a *tall ſteeple*, *tower*, or *pillar*, but a *high ſteeple*, &c. For the diſtinctions in theſe caſes, ſee HIGH.

LONG. *adj.* A relative term, denoting the diſtance between the extremes of any body, which is extended more in one of its geometrical dimenſions than another. Oppoſed to *ſhort*.

1. This term may be applied to all inanimate objects, of whatever kind, whoſe dimenſions in one way exceeds the other, and when not in an erect poſture, whatever be the other circumſtances attending them; whether it relates to ſuperficies alone, or to ſolid bodies; whether theſe be bounded or open, ſtraight or crooked, flexible or rigid, or in any other circumſtances whatever: thus we ſay, *a long* or *ſhort line*, *a long* or *ſhort ridge*, *ſtreet*, *ditch*, *rope*, *chain*, *ſtaff*, &c. But it is to be obſerved, that although *long* is in the ſtrict ſenſe only oppoſed to *ſhort*; yet as it expreſſes the extenſion of matter in one of its geometrical proportions, it is often contraſted by thoſe words which expreſs the other proportions when we mean only to deſcribe the ſeveral proportions; as, *a table long and broad*. And as theſe ſeveral dimenſions are expreſſed by different words, according to the various forms, modifications, and circumſtances, in which bodies are found, therefore it is in this ſenſe contraſted by a great diverſity of terms: as, *a long and broad* or *wide*, *narrow* or *ſtrait*, *ſtreet* or *lane*; *a long and thick*, or *ſmall*, *rope*, *chain*, *ſtaff*, &c. For the diſtinctions in theſe caſes, ſee BROAD, WIDE, &c.

2. Objects neceſſarily fixed in an erect poſition can never have this term applied to them; and therefore we cannot ſay *a long*, but *a high*, *tower* or *ſteeple*. And for the ſame reaſon, while trees are growing and fixed in an erect poſition, we cannot apply this term to them; but when they are felled and laid upon the ground, it is quite proper and neceſſary. Thus, we do not ſay *a long*, but *a tall* or *high tree*, while it is growing; but we ſay *a long*, not *a tall*, *log of wood*: and in the ſame manner we ſay *a tall maſt*, when it is fixed in the ſhip; but *a long maſt*, while it lies upon the beach. See TALL and HIGH.

3. Thoſe vegetables which are of a tender pliant nature, or ſo weak as not to be able to retain a fixt poſition, being conſidered as of a middle nature between erect and proſtrate bodies, admit of either of the terms *long*, *tall*, or *high*; as, *a long* or *tall ruſh* or *willow wand*, or *a long*, *tall*, or *high ſtalk of corn*. See HIGH and TALL.

4. The parts of vegetables, when conſidered as diſtinct from the whole, even when growing and erect, aſſume the term *long*: for we do not ſay *a tall*, but *a long*, *ſhoot of a tree*; and *a tree with a long ſtem*, in preference to *a tree with a high ſtem*.

5. For the ſame reaſon, a ſtaff, and pole, even when fixed in a perpendicular direction, aſſume the word *long*, in preference to *tall* or *high*.

6. With regard to animals, the general rule is applied, without any exceptions: *tall*, and not *long*, being employed to denote the height of the human body, when in an erect poſture; and *long*, and not *tall*, to denote its length when in an incumbent ſituation. *Long*, applied to all other animals which do not walk erect, always denotes their greateſt length in a horizontal poſition from head to tail.

7. In a figurative ſenſe, it denotes, with regard to time, any thing at a great diſtance from us.

8. As alſo, any thing that takes up much time before it is finiſhed; as, *a long diſcourſe*, *a protracted note in muſic*, &c.

BROAD. *adj.* The diſtance between the two neareſt ſides of any body, whoſe geometrical dimenſions are larger in one direction than in another; and has a reference to ſuperficies only, and never to the ſolid contents. Oppoſed to *narrow*.

1. *Broad*, in the ſtricteſt acceptation, is applied to denote thoſe bodies only whoſe ſides are altogether open and unconfined; as, *a broad table*, *a broad wheel*, &c.: and in theſe caſes it is invariably contraſted by the word *narrow*; nor is there any other word which in theſe caſes can be conſidered as ſynonymous with it, or uſed in its ſtead.

2. When any object is in ſome ſort bounded on the ſides, although not quite cloſed up, as a road, ſtreet, ditch, &c. either *broad* or *wide* may be employed, but with ſome difference of ſignification; *broad* being moſt properly uſed for thoſe that are more open, and *wide* for thoſe which are more confined: nor can this term be ever applied to ſuch objects as are cloſe bounded all around, as a houſe, a church, &c. *wide* being here employed. For the more accurate diſtinctions in theſe caſes, ſee the article WIDE.

WIDE. *adj.* A term employed to denote relative extent in certain circumſtances. Oppoſed to *narrow* and *ſtrait*.

1. This term is in its proper ſenſe applied only to denote the ſpace contained within any body cloſed all round on every ſide; as a houſe, gate, &c.: and differs from *broad* in this, that it never relates to the ſuperficies of ſolid objects, but is employed to expreſs the capaciouſneſs of any body which containeth vacant ſpace; nor can capaciouſneſs in this ſenſe be expreſſed by any other word but *wide*.

2. As many bodies may be conſidered either with reſpect to their capaciouſneſs, or ſuperficial extent; in all theſe caſes, either the term *broad* or *wide* may be uſed; as, *a broad* or *wide ſtreet* or

ditch, &c. but with a greater or leſs degree of propriety, according to the circumſtances of the object, or the idea we wiſh to convey. In a ſtreet where the houſes are low and the boundaries open, or in a ditch of ſmall depth and large ſuperficies, as this largeneſs of ſuperficies bears the principal proportion, *broad* would be more proper: but if the houſes are of great height, or the ditch of great depth, and capaciouſneſs is the principal property that affects the mind, we would naturally ſay *a wide ſtreet* or *ditch;* and the ſame may be ſaid of all ſimilar caſes. But there are ſome caſes in which both theſe terms are applied, with a greater difference of meaning; thus we ſay, *a broad* or *a wide gate:* But as the gate is employed to denote either the aperture in the wall, or the matter which cloſes that aperture, theſe terms are each of them uſed to denote that particular quality to which they are generally applied: and as the opening itſelf can never be conſidered as a ſuperficies, the term *wide*, in this caſe, denotes the diſtance between the ſides of the aperture; while, on the contrary, *broad* denotes the extent of matter fitted to cloſe that aperture; nor can theſe two terms in any caſe be ſubſtituted for one another.

3. As a figurative expreſſion, it is uſed as a cant phraſe for a miſtake: as, *you are wide of the mark;* that is, not near the truth.

NARROW. *adj.* A relative term, denoting a proportional ſmallneſs of diſtance between the ſides of the ſuperficies of plain bodies. Oppoſed to *broad.*

1. As this is only applied to ſuperficies, it is exactly contraſted by *broad*, and is applied in all caſes where the term *broad* can be uſed, (ſee BROAD); and in no other caſe but as a contraſt to it, except the following.
2. It ſometimes is employed to deſcribe the ſmallneſs of ſpace circumſcribed between certain boundaries, as oppoſed to *wide*, and nearly ſynonymous with *ſtrait;* as we ſay *a wide* or *a narrow houſe, church*, &c. For the neceſſary diſtinctions here, ſee the article STRAIT.
3. In a figurative ſenſe it denotes *parſimony, poverty, confined ſentiments*, &c.

STRAIT. *adj.* A relative term, denoting the extent of ſpace in certain circumſtances. Oppoſed to *wide*; ſee WIDE.

1. This term is employed, in its proper ſenſe, to denote only ſpace, as contained between ſurrounding bodies in ſuch circumſtances as to denote ſome degree of confinement; and is exactly oppoſed to *wide:* as, *a wide* or *a ſtrait gate*, &c. See WIDE.
2. So neceſſary is it that the idea of confinement ſhould be connected with this word, that in all thoſe caſes where the ſpace contained is large, as in a church or houſe, we cannot expreſs a ſmaller proportional width by this term. And as we have no other word to expreſs ſpace in theſe circumſtances, we have been obliged to force the word *narrow* from its natural ſignification, and make it expreſs this. See NARROW.
3. In ſome particular caſes, *narrow* or *ſtrait* may be employed to the ſame object; as, *a narrow* or *a ſtrait lane:* but here *ſtrait* is never employed but where an idea of confinement is ſuggeſted, and where it is exactly contraſted to *wide;* nor can *narrow* be employed but in ſuch circumſtances where *broad* would be a perfect contraſt to it. Therefore theſe two terms may be always employed in the ſame circumſtances as thoſe which contraſt them may be. For an account of which, ſee WIDE.
4. The term *ſtrait* is likewiſe in a peculiar manner uſed to denote the ſmallneſs of the internal diameter of thoſe ſmall bodies which are fitted to receive or contain others, as any kind of bag, tube, body-cloaths, mortoiſes, and others of the ſame kind; and in all theſe caſes this term may be employed to denote the ſmallneſs of their leſſer diameter, and never the term *narrow.* But in certain circumſtances the word *tight* may be ſubſtituted for it. See TIGHT.
5. *Strait*, in a figurative ſenſe, denotes any ſort of confinement of ſentiment or diſpoſition.

TIGHT. *adj.* A term employed in certain circumſtances to denote the internal capacity of particular bodies. Nearly ſynonymous with *ſtrait.*

This term is confined entirely to denote the ſmallneſs of the internal dimenſions of ſuch objects as are formed to cover or to receive or contain other ſolid bodies, and can be employed in no other caſe. And although it agrees with *ſtrait*, in always denoting confinement, and by being applicable to the ſame ſpecies of objects, yet it differs in the following reſpects: 1. If there be any difference of the diameter of the objects to which the term *ſtrait* can be applied, it always has reference to the ſmaller; yet *tight* may be applied to any ſort of confinement, whether it regards the length or breadth. 2. *Strait* can be applied to all bodies of capacity when of ſmall diameter, without any ſort of reference to the nature of the ſubſtance which it may be capable of containing. For we can ſay *a ſtrait bag, a ſtrait ſleeve, a ſtrait mortoiſe, a ſtrait gate*, &c. whereas *tight* can only be applied to any body when it is conſidered as having reference to another body which is intended to be contained in it, and is pinched for want of room. Thus, we ſay, *the ſleeve of a coat is too tight for the arm, the mortoiſe is too tight for the tenon*, &c.; but we cannot ſay, *the bag*, or *the gate, is too tight*, becauſe theſe are fitted to receive any ſort of objects. And hence it happens, that, in many caſes, the dimenſions of the ſame body may be expreſſed by *tight* or *ſtrait* when conſidered in different circumſtances. Thus, we may ſay, *this ſleeve is too ſtrait*, when we look at a coat when lying on the table, and conſider its proportions; but it is not till we have tried it upon the arm that it is intended to cover, that we call it *tight.* And we may ſay, *a gate is too ſtrait*, or *too tight:* but in the firſt caſe we conſider it as being too confined for admitting objects to paſs through it; and in the laſt, as being too confined with reſpect to the leaves that are to ſhut the aperture, not allowing them ſpace to move with freedom.

Theſe examples may ſerve to give ſome idea of the plan of an Engliſh Dictionary compoſed upon philoſophical principles: But, beſides the circumſtances above enumerated, there are many others which would require particular attention in the execution of a work of this kind. In the Engliſh language, a great variety of terms occur, which denote matter under certain general forms or circumſtances, without regarding the minute diverſities that may take place; as the word *cloth*, which denotes matter as manufactured into a particular form, including under it all the variety of ſtuffs manufactured in that particular way, of whatever materials, colours, texture, or fineneſs, they may be. The ſame may be ſaid of *wood*, *iron*, *yarn*, and a great variety of terms of the ſame nature, ſome of which cannot aſſume any plural; while others admit of it in all caſes, and others admit or refuſe it according to the different circumſtances in which they are conſidered. In a dictionary, therefore, all this variety of caſes ought to be clearly and diſtinctly pointed out under each particular article: this is the more neceſſary, as ſome of theſe words have others formed from them, which might be readily miſtaken for their plurals, altho' they have a very different ſignification; as *cloaths*, which does not denote any number of pieces or different kinds of *cloth*, but *wearing apparel*. The following example will illuſtrate this head.

WOOD. *ſub.* A ſolid ſubſtance, of which the trunks and branches of trees conſiſt.

1. This term is employed to denote the ſolid parts of vegetables of all kinds, in whatever form or circumſtances they are found. Nor does this term admit of plural with propriety, unleſs in the circumſtances after-mentioned: for we ſay, *many different kinds of wood*, in preference to *many kinds of woods*; or, we ſay, *oak*, *aſh*, or *elm wood*, not *woods*.
2. But where we want to contraſt *wood* of one quality or country with that of another, it admits of a plural: for we ſay, *white woods are in general ſofter than red*; or *Weſt-Indian woods are in general of greater ſpecific gravity than the European woods:* But unleſs where the colour, or ſome quality which diſtinguiſhes it from growing wood, is mentioned, this plural ought as much as poſſible to be avoided, as it always ſuggeſts an idea of growing wood.
3. *Wood* likewiſe denotes a number of trees growing near one another; being nearly ſynonymous with *foreſt:* See Forest. In this ſenſe it always admits of a plural; as, *Ye woods and wilds whoſe ſolitary gloom*, &c.

A Dictionary cannot be reckoned complete without explaining obſolete words; and if the terms of the ſeveral provincial dialects were likewiſe given, it would be of great utility: nor would this take much time; becauſe a number of theſe words need no other explanation than to mark along with them the words which had come in their place, when there happened to be one perfectly ſynonymous: and in thoſe caſes where the ſame idea could not be expreſſed in modern language without a periphraſis, it would be of uſe to explain them diſtinctly; ſo that, when a writer found himſelf at a loſs for a term, and obliged to ſearch for one beyond the bounds of our own language, he might take one of theſe, when he found that it was expreſſive and energetic, in preference to another drawn from a foreign language. This would at leaſt have one good effect: it would make our language more fixed and ſtable; not to ſay more accurate and preciſe, than by borrowing from foreign languages. The following examples may ſerve to give ſome idea of the manner of treating this part of the work.

MOE, or mo. *adj.* An obſolete term, ſtill employed in the Scotch dialect, and by them pronounced *mae;* denoting a greater number, and nearly ſynonymous with *more:* but it differs in this reſpect, that, in the Scotch dialect, *mae* and *mair* (Engliſh, *more*) are each employed in their diſtinct ſphere, without encroaching upon one another; *mae* being employed to denote number, but never quantity or quality; and *mair*, to denote quantity and quality, but never number: thus they ſay *mae*, not *mair*, *apples*, *men*, &c. and they ſay *mair*, not *mae*, *cloth*, *earth*, *courage*, &c. See Mair. Both of theſe terms are ſupplied by the word *more;* which, in the Engliſh language, is applied indiſcriminately to denote quantity, quality, and number. See More.

THIR. pron. Obſolete; ſtill employed in the Scotch dialect: the plural of *this;* and contraſted to *theſe*, in the ſame manner as *that* is to *this*.

As there is no word in the Engliſh language equivalent to this, we thus ſhew the manner in which it is employed. In the Engliſh language we ſay, *that ſtone* or *houſe*, pointing at one at a diſtance, *is larger or more commodious than this ſtone* or *this houſe*, which is ſuppoſed to be at hand. In the ſame manner, in the Scotch dialect, they ſay, *theſe* (or, as it is pronounced, *thae*) *ſtones are whiter than thir ſtones;* denoting, that the former are at a diſtance, and the latter at hand. And, in the ſame manner, it is invariably applied to denote any preſent object in the plural number, as oppoſed to *theſe:* as *theſe* or *thir apples*, as at hand or at a diſtance; *theſe* or *thir trees*, &c.; but never in the ſingular number, as it is always *this* or *that tree*, *houſe*, &c.

As the Engliſh language is ſo exceedingly irregular in the pronunciation, the ſame letter in the ſame ſituation often aſſuming ſounds totally different in different words, it is impoſſible to eſtabliſh any general rules on this ſubject, which do not admit of many exceptions: therefore, a dictionary is the beſt means of aſcertaining and pointing out the proper pronunciation of words. For, if the writer firſt pointed out all the different ſounds that the ſame letter could ever be made to expreſs, and aſſigned to every particular ſound which each letter could be made to aſſume, a particular mark, which was appropriated to denote that particular ſound of the letter whenever it occurred; by placing theſe particular marks above the letters in the dictionary, the ſound of each letter would be pointed out in all caſes with the utmoſt certainty. It would be impoſſible for us to illuſtrate this by examples, without firſt aſcertaining all the ſounds of each letter; which would lead us into a diſcuſſion too long for this place; and this is at preſent the more unneceſſary, as the public have been long in expectation of a dictionary, by a very able hand, in which this particular will be attended to.

We ſhall only further obſerve, that, beſides having the accented ſyllable of every word *properly* diſtinguiſhed in a dictionary to aſſiſt in the pronunciation, the Engliſh language requires another eſſential improvement, *viz.* the uſe of accents to diſtinguiſh the meaning of *words* and *phraſes*; which, although it is not ſo properly confined to a lexicographer, yet it is not quite without his ſphere. Thus the word *as* admits of two very different ſounds, as well as different ſignifications; as in this example, "Cicero was nearly *as* eloquent *as* Demoſthenes:" in which the firſt *as* is pronounced *aſs*, and the laſt is pronounced *az*. Now, it often happens, that, in reading, the particular way in which it ought to be underſtood is not pointed out by the context, till after the word itſelf is pronounced, which has an equal chance at leaſt of being pronounced wrong; whereas, if it were always accented when employed in the one ſenſe, and not in the other, it would free the reader from this perplexity. There are other caſes in which the uſe of proper accents in writing would be of great conſequence; as at the beginning of a ſentence, when it was put as a queſtion, or uſed ironically, &c. the want of which every one muſt have obſerved. But as this does not ſo properly belong to the lexicographer as the grammarian, we ſhall here take no further notice of it.

The above examples, we hope, will be ſufficient to give the reader ſome idea of the plan that we would propoſe; and enable him to determine, whether or not a dictionary, executed upon this plan, would convey to his mind a more perfect knowledge of the Engliſh language, than thoſe dictionaries that have been hitherto publiſhed. Theſe examples were given rather with a view to ſhow the manner in which a work of this kind might be conducted, than as perfect and unexceptionable explanations of the ſeveral articles there enumerated; and therefore we did not think it neceſſary to produce any authorities, although we are ſenſible that they would be requiſite in a work of this kind.

DICTYS (Cretenſis), a very ancient hiſtorian, who ſerving under Idomeneus king of Crete in the Trojan war, wrote the hiſtory of that expedition in nine books; and Tzetzes tells us, that Homer formed his Iliad upon the plan of that hiſtory. It is however maintained, that the Latin hiſtory of Dictys which we have at preſent is ſpurious.

DIDACTIC, in the ſchools, ſignifies the manner of ſpeaking, or writing, adapted to teach or explain the nature of things.

Didactic *Poetry*. See Poetry, nº 69, &c.

DIDAPPER, in ornithology. See Columbus.

DIDELPHIS, or oppoſſum, in zoology; a genus of quadrupeds belonging to the order of feræ, the characters of which are theſe: they have ten fore-teeth in the upper jaw, and eight in the under one. The dog-teeth are long; the tongue is ſomewhat ciliated; and they have a pocket formed by a duplicature of the ſkin of the belly, in which the dugs are included.

There are ſix ſpecies. 1. The marſupialis, with a long ſharp-pointed noſe; large, round, naked, and very thin ears; ſmall, black, lively, eyes; long ſtiff hairs on each ſide the noſe, and behind the eyes: the hind part of the neck and back covered with hair two inches long; the bottoms of a yellowiſh white, middle part black, ends whitiſh: the ſides covered with hair of a dirty and duſky colour; the belly with ſoft, woolly, dirty white hair: the tail, for near three inches, clothed with long hairs like thoſe on the back; the reſt of the tail covered with ſmall ſcales. The tail of this animal has a diſagreeable appearance, looking like the body of a ſnake, and has the ſame prehenſile quality with that of ſome monkeys; the body is round and pretty thick, the legs ſhort: on the lower part of the belly of the female is a large pouch, in which the teats are lodged, and where the young ſhelter as ſoon as they are born. The length of the body is 16 or 17 inches; that of the tail 14.—This creature inhabits many parts of America and the Eaſt Indies. It is very deſtructive to poultry, and ſucks the blood without eating the fleſh; it feeds alſo on roots and wild fruits, and is very active in climbing trees. It hunts eagerly after birds and their neſts; and will hang ſuſpended from the branches of a tree by its tail; then, by ſwinging its body, it will fling itſelf among the trees that grow in the neighbourhood. It walks very ſlow; and when purſued and overtaken, will feign itſelf dead. It is not eaſily killed, being as tenacious of life as a cat. When the female is about to bring forth, ſhe makes a thick neſt of dry graſs in ſome cloſe buſh at the foot of a tree; and brings four, five, or ſix, young at a time. As ſoon as the young are brought forth, they take ſhelter in the pouch or falſe belly; and faſten ſo cloſely to the teats, that they cannot be ſeparated without difficulty. They are blind, naked, and very ſmall, when new-born, and reſemble fetuſes: it is therefore neceſſary that they ſhould continue in that falſe belly, till they attain proper ſtrength and ſight; and are prepared to undergo what may be called a *ſecond birth.* After this they run into the pouch as into an aſylum in time of danger; and the parent carries them about with her. During the time of this ſecond geſtation, the female ſhews an exceſſive attachment to her young, and will ſuffer any torture rather than allow this receptacle to be opened; for ſhe has the power of opening or cloſing it by the aſſiſtance of ſome very ſtrong muſcles. The fleſh of the old animal is very good, like that of a ſucking pig: the hair is dyed by the Indian women, and wove into garters and girdles: the ſkin is very fetid.

Plate
LXXXVII.
fig. 7.

2. The murina, hath the face and upper parts of the body of a tawny colour; the belly yellowiſh white; the tail ſlender, and covered with minute ſcales to the very rump: the length from the noſe to the tail, about ſix inches and a half; the tail of the ſame length: the female wants the falſe belly of the former; but on the lower part the ſkin forms on each ſide a fold, between which the teats are lodged. It inhabits the hot parts of South America; agrees with the others in its food manners, and the prehenſile power of its tail. It brings from 10 to 14 young ones at a time: they affix themſelves to the teats as ſoon as they are born, and remain attached like inanimate things, till they attain growth and vigour to ſhift a little for themſelves.

3. The Mexican oppoſſum, is of an aſh-colour on the head and upper parts of the body: the belly and legs whitiſh: the tail long and pretty thick, varied with brown and yellow; it is hairy near an inch from its origin, the reſt naked: the length from the noſe to the tail, about ſeven inches and a half; of the tail, more than 11.—It inhabits the mountains of Mexico,

and lives in trees, where it brings forth its young: when in any fright, they embrace the parent cloſely; the tail is prehenſile, and ſerves inſtead of a hand.

4. The ſhort-tailed opoſſum, hath the back of a dull red, and the belly of a paler colour; the tail ſcarce half the length of the body, thick at the baſe, and gradually leſſening towards the end: no falſe belly. It inhabits South America: the young adhere to the teats as ſoon as born. Seba ſays, it lives in woods, and brings from 9 to 12 young ones at a time.

5. The oppoſſum of Surinam, hath the upper part of the body reddiſh, mixed with a light aſh-colour and yellow: the under-parts are of a dirty yellowiſh white; the bottom of the tail is covered with hair, for near two inches and a half; the reſt naked: the length from the noſe to the tail near nine inches; the tail ten. It inhabits Surinam, and perhaps may be the ſpecies called by the coloniſts the *cane-rat;* which is ſo deſtructive to the ſugar-canes.

6. The dorſigera, or merian oppoſſum, hath the head and upper part of the body, of a yellowiſh brown colour; the belly white, and tinged with yellow; the tail very long and ſlender, and, except at the baſe, quite naked.—It is a native of Surinam, and burrows under ground: it brings five or ſix young at a time, which follow their parent: On any apprehenſion of danger, they all jump on her back; and, twiſting their tails round her's, ſhe immediately runs with them into her hole.

DIDO, the daughter of Belus king of Tyre, and the wife of Sichæus. To avoid the tyranny of her brother Pygmalion, who had put her huſband to death, ſhe fled into Africa, where ſhe built Carthage, 882 B. C. At length Hiarbas, king of the Getuli, having demanded her in marriage, and threatening, in caſe of refuſal, to make war on the Carthagenians, Dido cauſed a pile to be erected, and after having ſacrificed victims, as if to appeaſe the manes of her huſband, aſcended the pile, and ſtabbed herſelf with a poinard in ſight of the people. From this action ſhe obtained the name of *Dido*, or the *Reſolute Woman*, ſhe being before called *Eliſa*.—Virgil makes her cotemporary with Æneas, and his chronology is juſtified by Sir Iſaac Newton; while other learned men maintain that Æneas was never either in Carthage or Italy, and that he lived above 300 years before Dido.

DIDUS, or DODO, in ornithology, a genus belonging to the order of gallinæ. The bill is contracted in the middle by two tranſverſe rugæ; each mandible is inflected at the point; and the face is bare behind the eyes. The body is blackiſh and cloudy; the tail is very ſhort, and the upper part of the bill red. It is a native of India; and is incapable of flying, becauſe the wings are not furniſhed with feathers ſufficient for that purpoſe.

DIDYMUS of Alexandria, an eccleſiaſtical writer of the fourth century; who, though he is ſaid to have loſt his eyes at five years of age, when he had ſcarcely learned to read, yet applied ſo earneſtly to ſtudy, that he attained all the philoſophic arts in a high degree, and was thought worthy to fill the chair in the famous divinity-ſchool at Alexandria. He was the author of a great number of works: but all we have now remaining, are a Latin tranſlation of his book upon the *Holy Spirit*, in the works of St Jerome who was the tranſlator; ſhort ſtrictures on the Canonical epiſtles; and a book againſt the Manichees.

DIDYNAMIA, (from δις twice, and δυναμις power), the name of the 14th claſs in Linnæus's ſexual method; conſiſting of plants with hermaphrodite flowers, which have four ſtamina or male organs, two of which are long and two ſhort. See BOTANY, p. 1292, and Plate LIX. fig. 14.

DIEMERBROEK (Iſbrand), a learned profeſſor of phyſic and anatomy at Utrecht, was born at Montfort, in Holland, in 1609, where he acquired great reputation by his lectures and his practice; and died at Utrecht, in 1674. He wrote a treatiſe on the plague, which is eſteemed; and ſeveral learned works in anatomy and medicine; which were printed at Utrecht in 1685, in folio.

DIEPPE, a handſome ſea-port town of France, in Upper Normandy, in the territory of Caux; with a good harbour, an old caſtle, and two handſome moles. The pariſh-church of St James is an elegant ſtructure; and there is a tower from which, in fine weather, the coaſt of England may be ſeen. The principal trade conſiſts in herrings, whitings, mackerel, ivory, toys, and laces. It was bombarded by the Engliſh in 1694, and it is not now ſo conſiderable as it was formerly. It is ſeated at the mouth of the river Argues, in E. Long. 1. 9. N. Lat. 49. 55.

DIES MARCHIÆ was the day of congreſs, or meeting of the Engliſh and Scots, annually appointed to be held on the marches or borders, in order to adjuſt all differences between them.

DIESIS, in muſic, is the diviſion of a tone leſs than a ſemitone; or an interval conſiſting of a leſs or imperfect ſemitone.

Dieſis is the ſmalleſt and ſofteſt change or inflexion of the voice imaginable: it is called a *faint*, expreſſed thus X, by a St Andrew's croſs, or ſaltier.

DIET, in medicine, according to ſome, comprehends the whole regimen, or rule of life, with regard to the ſix non-naturals; air, meats, and drinks, ſleep, and watching, motion and reſt, paſſions of the mind, retentions and excretions. Others reſtrain the term of *diet*, to what regards eating and drinking, or ſolid aliments and drinks. See FOOD.

The natural conſtitution of the body of man is ſuch, that it can eaſily bear ſome changes and irregularities, without much injury: had it been otherwiſe, we ſhould be almoſt conſtantly put out of order by every ſlight cauſe. This advantage ariſes from thoſe wonderful communications of the inward parts, whereby, when one part is affected, another comes immediately to its relief.

Thus, when the body is too full, nature cauſes evacuations through ſome of the outlets: and for this reaſon it is, that diſeaſes from inanition are generally more dangerous than from repletion; becauſe we can more expeditiouſly diminiſh than increaſe the juices of the body. Upon the ſame account alſo, though temperance be beneficial to all men, the ancient phyſicians adviſed perſons in good health and their own maſters, to indulge a little now and then, by eating and drinking more plentifully than uſual. But, of the two, intemperance in drinking is ſafer than in eating: and if a perſon has committed exceſs in the latter, cold water drank upon a full ſtomach will help digeſtion; to which it will be of ſervice to add lemon juice, or elixir of vitriol. If he has eaten high ſeaſoned things, rich ſauces, &c. then let him ſit up for ſome little time, and afterwards ſleep. But if a man happen to be obliged to faſt, he ought to avoid all laborious work. From ſatiety it is not proper to paſs directly to ſharp hunger, nor from hunger to ſatiety: neither will it be ſafe to indulge abſolute reſt immediately after exceſſive labour, nor ſuddenly fall to hard work after long idleneſs. In a word, therefore, all changes in the way of living ſhould be made by degrees.

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DIFFERENCE, in mathematics, is the remainder, when one number or quantity is ſubtracted from another.

Difference, in logic. See Logic, n° 20—24.

Difference, in heraldry, a term given to a certain figure added to coats of arms, ſerving to diſtinguiſh one family from another; and to ſhew how diſtant younger branches are from the elder or principal branch.

DIFFERENTIAL, differentiale, in the higher geometry, an infinitely ſmall quantity, or a particle of quantity ſo ſmall as to be leſs than any aſſignable one. It is called a *differential*, or *differential quantity*, becauſe frequently conſidered as the difference of two quantities; and, as ſuch, is the foundation of the *differential calculus*: Sir Iſaac Newton, and the Engliſh, call it a *moment*, as being conſidered as the momentary increaſe of quantity. See Fluxions.

DIEXAHEDRIA, in natural hiſtory, a genus of pellucid and cryſtalliform ſpars, compoſed of two pyramids, joined baſe to baſe, without any intermediate column: the diexahedria are dodecahedral, or compoſed of two hexangular pyramids.

DIFFUSE, an epithet applied to ſuch writings as are wrote in a prolix manner. Among hiſtorians, Salluſt is reckoned ſententious, and Livy diffuſe. Thus alſo among the orators, Demoſthenes is cloſe and conciſe; Cicero, on the other hand, is diffuſe.

DIFFUSION, the diſperſion of the ſubtile effluvia of bodies into a kind of atmoſphere all round them. Thus the light diffuſed by the rays of the ſun, iſſues all round from that amazing body of fire.

DIGASTRICUS, in anatomy, a muſcle of the lower jaw, called alſo Biventer.

DIGBY (Sir Kenelm), became very illuſtrious in the 17th century for his virtue and learning. He was deſcended of an ancient family in England. His great-grandfather, accompanied by ſix of his brothers, fought valiantly at Boſworth-field on the ſide of Henry VII. againſt the uſurper Richard III. His father, Everard, ſuffered himſelf to be engaged in the gun-powder plot againſt king James I. and for that crime was beheaded. His ſon wiped off that ſtain, and was reſtored to his eſtate. King Charles I. made him gentleman of the bed-chamber, commiſſioner of the navy, and governor of the Trinity-houſe. He granted him letters of repriſal againſt the Venetians, by virtue whereof he took ſeveral prizes with a ſmall fleet which he commanded. He fought the Venetians near the port of

Scanderoon, and bravely made his way through them with his booty. He was a great lover of learning, and tranſlated ſeveral authors into Engliſh; and his "Treatiſe of the Nature of Bodies and the Immortality of the Soul," diſcovers great penetration and extenſive knowledge. He applied to chemiſtry; and found out ſeveral uſeful medicines, which he gave freely away to people of all ſorts, eſpecially to the poor. He diſtinguiſhed himſelf particularly by his ſympathetic powder for the cure of wounds at a diſtance; his diſcourſe concerning which made a great noiſe for a while. He had conferences with Des Cartes about the nature of the ſoul.

In the beginning of the civil wars, he exerted himſelf very vigorouſly in the king's cauſe; but he was afterwards impriſoned, by the parliament's order, in Wincheſter houſe, and had leave to depart thence in 1643. He afterwards compounded for his eſtate, but was ordered to leave the nation; when he went to France, and was ſent on two embaſſies to pope Innocent X. from the queen, widow to Charles I. whoſe chancellor he then was. On the reſtoration of Charles II. he returned to London; where he died in 1665, aged 60.

This eminent perſon was, for the early pregnancy of his parts, and his great proficiency in learning, compared to the celebrated Picus de Mirandola, who was one of the wonders of human nature. His knowledge, though various and extenſive, appeared to be greater than it really was; as he had all the powers of elocution and addreſs to recommend it. He knew how to ſhine in a circle of ladies, or philoſophers; and was as much attended to when he ſpoke on the moſt trivial ſubjects, as when he ſpoke on the moſt important. It is ſaid that one of the princes of Italy, who had no child, was deſirous that his princeſs ſhould bring him a ſon by Sir Kenelm, whom he eſteemed a juſt model of perfection.

DIGEST, in matters of literature, a collection of the deciſions of the Roman lawyers properly digeſted, or arranged under diſtinct heads, by order of the emperor Juſtinian. It conſtitutes the firſt part or volume of the civil law.

DIGESTION, in medicine, is the diſſolution of the aliments into ſuch minute parts as are fit to enter the lacteal veſſels, and circulate with the maſs of blood. See ANATOMY, nº 366—369.

DIGESTION, in chemiſtry, is an operation which conſiſts in expoſing bodies to a gentle heat, in proper veſſels, and during a certain time. This operation is very uſeful to favour the action of certain ſubſtances upon each other; as, for example, of well calcined, dry, fixed alkali upon rectified ſpirit of wine. When theſe two ſubſtances are digeſted together in a matraſs, with a gentle ſand-bath heat, the ſpirit of wine acquires a yellow-reddiſh colour, and an alkaline quality. The ſpirit would not ſo well acquire theſe qualities by a ſtronger and ſhorter heat.

Want of DIGESTION, a diſeaſe attended with pain and a ſenſe of weight, with eructations and copious flatulencies from corrupt humours in the ſtomach.

DIGESTIVE, in medicine, ſuch remedies as ſtrengthen and increaſe the tone of the ſtomach, and aſſiſt in the digeſtion of foods. To this claſs belong all ſtomachics and ſtrengtheners or corroborants.

DIGGING, among miners, is appropriated to the operation of freeing any kind of ore from the bed or ſtratum in which it lies, where every ſtroke of their tools turns to account: in contradiſtinction to the openings made in ſearch of ſuch ore, which are called *hatches*, or *eſſay-hatches*; and the operation itſelf, *tracing of mines*, or *hatching*.

When a bed of ore is diſcovered, the beele-men, ſo called from the inſtrument they uſe, which is a kind of pick-ax, free the ore from the foſſils around it; and the ſhovel-men throw it up from one ſhamble to another, till it reaches the mouth of the hatch.

In ſome mines, to ſave the expence as well as fatigue of the ſhovel-men, they raiſe the ore by means of a winder and two buckets, one of which goes up as the other comes down.

DIGIT, in aſtronomy, the twelfth part of the diameter of the ſun or moon, uſed to expreſs the quantity of an eclipſe. Thus an eclipſe is ſaid to be of ſix digits, when ſix of theſe parts are hid.

DIGITS, or *Monades*, in arithmetic, ſignify any integer under 10; as 1, 2, 3, 4, 5, 6, 7, 8, 9.

DIGIT is alſo a meaſure taken from the breadth of the finger. It is properly ¾ of an inch, and contains the meaſure of four barley-corns laid breadth-wiſe.

DIGITALIS, FOX-GLOVE; a genus of the angioſpermia order, belonging to the didynamia claſs of plants.—There are ſix ſpecies; five of which are hardy, herbaceous, biennial and perennial plants, and the ſixth a tender ſhrubby exotic. The herbaceous ſpecies riſe two or three feet high, crowned with ſpikes of yellow iron-coloured or purple flowers. The ſhrubby ſort riſes five or ſix feet high, having ſpear-ſhaped rough leaves, four or five inches long, and half as broad; the branches being all terminated with flowers growing in looſe ſpikes.—All the ſpecies are eaſily raiſed by ſeeds.—An ointment made of the flowers of purple fox-glove and May-butter, is much commended by ſome phyſicians for ſcrophulous ulcers which run much and are full of matter. Taken internally, this plant is a violent purgative and emetic; and is therefore only to be adminiſtered to robuſt conſtitutions. The country people in England frequently uſe a decoction of it with polypody of the oak in epileptic fits. In Italy, fox-glove is eſteemed an excellent vulnerary.

DIGITATED, among botaniſts. See BOTANY, p. 1297.

DIGLYPH, in architecture, a kind of imperfect triglyph, conſole, or the like; with two channels or engravings, either circular or angular.

DIGNE, an epiſcopal town of Provence in France, famous for the baths that are near it. It is ſeated on a river called Marderic, in E. Long. 5. 27. N. Lat. 44. 5.

DIGNITARY, in the canon law, a perſon who holds a dignity, that is, a benefice which gives him ſome pre-eminence over mere prieſts and canons. Such is a biſhop, dean, arch-deacon, prebendary, &c.

DIGNITY, as applied to the titles of noblemen, ſigfies honour and authority. And *dignity* may be divided into ſuperior and inferior; as the titles of duke, earl, baron, &c. are the higheſt names of *dignity;* and thoſe of baronet, knight, ſerjeant at law, &c. the loweſt. NOBILITY only can give ſo high a name of dignity as to ſupply the want of a ſurname in legal proceedings;

it will be of ſervice to add lemon juice, or elixir of vitriol. If he has eaten high ſeaſoned things, rich ſauces, &c. then let him ſit up for ſome little time, and afterwards ſleep. But if a man happen to be obliged to faſt, he ought to avoid all laborious work. From ſatiety it is not proper to paſs directly to ſharp hunger, nor from hunger to ſatiety: neither will it be ſafe to indulge abſolute reſt immediately after exceſſive labour, nor ſuddenly fall to hard work after long idleneſs. In a word, therefore, all changes in the way of living ſhould be made by degrees.

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DIFFERENCE, in heraldry, a term given to a certain figure added to coats of arms, ſerving to diſtinguiſh one family from another; and to ſhew how diſtant younger branches are from the elder or principal branch.

DIFFERENTIAL, DIFFERENTIALE, in the higher geometry, an infinitely ſmall quantity, or a particle of quantity ſo ſmall as to be leſs than any aſſignable one. It is called a *differential*, or *differential quantity*, becauſe frequently conſidered as the difference of two quantities; and, as ſuch, is the foundation of the *differential calculus*: Sir Iſaac Newton, and the Engliſh, call it a *moment*, as being conſidered as the momentary increaſe of quantity. See FLUXIONS.

DIEXAHEDRIA, in natural hiſtory, a genus of pellucid and cryſtalliform ſpars, compoſed of two pyramids, joined baſe to baſe, without any intermediate column: the diexahedria are dodecahedral, or compoſed of two hexangular pyramids.

DIFFUSE, an epithet applied to ſuch writings as are wrote in a prolix manner. Among hiſtorians, Salluſt is reckoned ſententious, and Livy diffuſe. Thus alſo among the orators, Demoſthenes is cloſe and conciſe; Cicero, on the other hand, is diffuſe.

DIFFUSION, the diſperſion of the ſubtile effluvia of bodies into a kind of atmoſphere all round them. Thus the light diffuſed by the rays of the ſun, iſſues all round from that amazing body of fire.

DIGASTRICUS, in anatomy, a muſcle of the lower jaw, called alſo BIVENTER.

DIGBY (Sir Kenelm), became very illuſtrious in the 17th century for his virtue and learning. He was deſcended of an ancient family in England. His great-grandfather, accompanied by ſix of his brothers, fought valiantly at Boſworth-field on the ſide of Henry VII. againſt the uſurper Richard III. His father, Everard, ſuffered himſelf to be engaged in the gun-powder plot againſt king James I. and for that crime was beheaded. His ſon wiped off that ſtain, and was reſtored to his eſtate. King Charles I. made him gentleman of the bed-chamber, commiſſioner of the navy, and governor of the Trinity-houſe. He granted him letters of repriſal againſt the Venetians, by virtue whereof he took ſeveral prizes with a ſmall fleet which he commanded. He fought the Venetians near the port of

Scanderoon, and bravely made his way through them with his booty. He was a great lover of learning, and tranſlated ſeveral authors into Engliſh; and his "Treatiſe of the Nature of Bodies and the Immortality of the Soul," diſcovers great penetration and extenſive knowledge. He applied to chemiſtry; and found out ſeveral uſeful medicines, which he gave freely away to people of all ſorts, eſpecially to the poor. He diſtinguiſhed himſelf particularly by his ſympathetic powder for the cure of wounds at a diſtance; his diſcourſe concerning which made a great noiſe for a while. He had conferences with Des Cartes about the nature of the ſoul.

In the beginning of the civil wars, he exerted himſelf very vigorouſly in the king's cauſe; but he was afterwards impriſoned, by the parliament's order, in Wincheſter houſe, and had leave to depart thence in 1643. He afterwards compounded for his eſtate, but was ordered to leave the nation; when he went to France, and was ſent on two embaſſies to pope Innocent X. from the queen, widow to Charles I. whoſe chancellor he then was. On the reſtoration of Charles II. he returned to London; where he died in 1665, aged 60.

This eminent perſon was, for the early pregnancy of his parts, and his great proficiency in learning, compared to the celebrated Picus de Mirandola, who was one of the wonders of human nature. His knowledge, though various and extenſive, appeared to be greater than it really was; as he had all the powers of elocution and addreſs to recommend it. He knew how to ſhine in a circle of ladies, or philoſophers; and was as much attended to when he ſpoke on the moſt trivial ſubjects, as when he ſpoke on the moſt important. It is ſaid that one of the princes of Italy, who had no child, was deſirous that his princeſs ſhould bring him a ſon by Sir Kenelm, whom he eſteemed a juſt model of perfection.

DIGEST, in matters of literature, a collection of the deciſions of the Roman lawyers properly digeſted, or arranged under diſtinct heads, by order of the emperor Juſtinian. It conſtitutes the firſt part or volume of the civil law.

DIGESTION, in medicine, is the diſſolution of the aliments into ſuch minute parts as are fit to enter the lacteal veſſels, and circulate with the maſs of blood. See ANATOMY, nº 366—369.

DIGESTION, in chemiſtry, is an operation which conſiſts in expoſing bodies to a gentle heat, in proper veſſels, and during a certain time. This operation is very uſeful to favour the action of certain ſubſtances upon each other; as, for example, of well calcined, dry, fixed alkali upon rectified ſpirit of wine. When theſe two ſubſtances are digeſted together in a matraſs, with a gentle ſand-bath heat, the ſpirit of wine acquires a yellow-reddiſh colour, and an alkaline quality. The ſpirit would not ſo well acquire theſe qualities by a ſtronger and ſhorter heat.

Want of DIGESTION, a diſeaſe attended with pain and a ſenſe of weight, with eructations and copious flatulencies from corrupt humours in the ſtomach.

DIGESTIVE, in medicine, ſuch remedies as ſtrengthen and increaſe the tone of the ſtomach, and aſſiſt in the digeſtion of foods. To this claſs belong all ſtomachics and ſtrengtheners or corroborants.

DIGGING, among miners, is appropriated to the operation of freeing any kind of ore from the bed or ſtratum in which it lies, where every ſtroke of their tools turns to account: in contradiſtinction to the openings made in ſearch of ſuch ore, which are called *hatches*, or *eſſay-hatches;* and the operation itſelf, *tracing of mines*, or *hatching*.

When a bed of ore is diſcovered, the beele-men, ſo called from the inſtrument they uſe, which is a kind of pick-ax, free the ore from the foſſils around it; and the ſhovel-men throw it up from one ſhamble to another, till it reaches the mouth of the hatch.

In ſome mines, to ſave the expence as well as fatigue of the ſhovel-men, they raiſe the ore by means of a winder and two buckets, one of which goes up as the other comes down.

DIGIT, in aſtronomy, the twelfth part of the diameter of the ſun or moon, uſed to expreſs the quantity of an eclipſe. Thus an eclipſe is ſaid to be of ſix digits, when ſix of theſe parts are hid.

DIGITS, or *Monades*, in arithmetic, ſignify any integer under 10; as 1, 2, 3, 4, 5, 6, 7, 8, 9.

DIGIT is alſo a meaſure taken from the breadth of the finger. It is properly $\frac{3}{4}$ of an inch, and contains the meaſure of four barley-corns laid breadth-wiſe.

DIGITALIS, FOX-GLOVE; a genus of the angioſpermia order, belonging to the didynamia claſs of plants.—There are ſix ſpecies; five of which are hardy, herbaceous, biennial and perennial plants, and the ſixth a tender ſhrubby exotic. The herbaceous ſpecies riſe two or three feet high, crowned with ſpikes of yellow iron-coloured or purple flowers. The ſhrubby ſort riſes five or ſix feet high, having ſpear-ſhaped rough leaves, four or five inches long, and half as broad; the branches being all terminated with flowers growing in looſe ſpikes.—All the ſpecies are eaſily raiſed by ſeeds.—An ointment made of the flowers of purple fox-glove and May-butter, is much commended by ſome phyſicians for ſcrophulous ulcers which run much and are full of matter. Taken internally, this plant is a violent purgative and emetic; and is therefore only to be adminiſtered to robuſt conſtitutions. The country people in England frequently uſe a decoction of it with polypody of the oak in epileptic fits. In Italy, fox-glove is eſteemed an excellent vulnerary.

DIGITATED, among botaniſts. See BOTANY, p. 1297.

DIGLYPH, in architecture, a kind of imperfect triglyph, conſole, or the like; with two channels or engravings, either circular or angular.

DIGNE, an epiſcopal town of Provence in France, famous for the baths that are near it. It is ſeated on a river called Marderic, in E. Long. 5. 27. N. Lat. 44. 5.

DIGNITARY, in the canon law, a perſon who holds a dignity, that is, a benefice which gives him ſome pre-eminence over mere prieſts and canons. Such is a biſhop, dean, arch-deacon, prebendary, &c.

DIGNITY, as applied to the titles of noblemen, ſignifies honour and authority. And *dignity* may be divided into ſuperior and inferior; as the titles of duke, earl, baron, &c. are the higheſt names of *dignity;* and thoſe of baronet, knight, ſerjeant at law, &c. the loweſt. NOBILITY only can give ſo high a name of dignity as to ſupply the want of a ſurname in legal proceedings;

ings; and as the omiſſion of a name of dignity may be pleaded in abatement of a writ, &c. ſo it may be where a peer who has more than one name of dignity, is not named by the Moſt Noble. No temporal dignity of any foreign nation can give a man a higher title here than that of ESQUIRE.

DIGNITY, in the human character, the oppoſite of *Meanneſs*.

Elements of Criticiſm.

Man is endued with a SENSE of the worth and excellence of his nature: he deems it more perfect than that of the other beings around him; and he perceives that the perfection of his nature conſiſts in virtue, particularly in virtues of the higheſt rank. To expreſs that ſenſe, the term *dignity* is appropriated. Further, to behave with dignity, and to refrain from all mean actions, is felt to be, not a virtue only, but a duty: it is a duty every man owes to himſelf. By acting in that manner, he attracts love and eſteem: by acting meanly, or below himſelf, he is diſapproved and contemned.

This ſenſe of the dignity of human nature, reaches even our pleaſures and amuſements. If they enlarge the mind by raiſing grand or elevated emotions, or if they humanize the mind by exerciſing our ſympathy, they are approved as ſuited to the dignity of our nature: if they contract the mind by fixing it on trivial objects, they are contemned as not ſuited to the dignity of our nature. Hence, in general, every occupation, whether of uſe or amuſement, that correſponds to the dignity of man, is termed *manly;* and every occupation below his nature, is termed *childiſh*.

To thoſe who ſtudy human nature, there is a point which has always appeared intricate: How comes it that generoſity and courage are more eſteemed, and beſtow more dignity, than good-nature, or even juſtice; though the latter contribute more than the former to private as well as to public happineſs? This queſtion, bluntly propoſed, might puzzle even a philoſopher; but, by means of the foregoing obſervations, will eaſily be ſolved. Human virtues, like other objects, obtain a rank in our eſtimation, not from their utility, which is a ſubject of reflection, but from the direct impreſſion they make on us. Juſtice and good-nature are a ſort of negative virtues, that ſcarce make any impreſſion but when they are tranſgreſſed: courage and generoſity, on the contrary, producing elevated emotions, enliven greatly the ſenſe of a man's dignity, both in himſelf and in others; and for that reaſon, courage and generoſity are in higher regard than the other virtues mentioned: we deſcribe them as grand and elevated, as of greater dignity, and more praiſe-worthy.

This leads us to examine more directly emotions and paſſions with reſpect to the preſent ſubject: and it will not be difficult to form a ſcale of them, beginning with the meaneſt, and aſcending gradually to thoſe of the higheſt rank and dignity. Pleaſure felt as at the organ of ſenſe, named *corporeal pleaſure*, is perceived to be low; and when indulged to exceſs, is perceived alſo to be mean: for that reaſon, perſons of any delicacy diſſemble the pleaſure they take in eating and drinking. The pleaſures of the eye and ear, having no organic feeling, and being free from any ſenſe of meanneſs, are indulged without any ſhame: they even riſe to a certain degree of dignity when their objects are grand or elevated. The ſame is the caſe of the ſympathetic paſſions: a virtuous perſon behaving with fortitude and dignity under cruel misfortunes, makes a capital figure; and the ſympathiſing ſpectator feels in himſelf the ſame dignity. Sympathetic diſtreſs at the ſame time never is mean: on the contrary, it is agreeable to the nature of a ſocial being, and has general approbation. The rank that love poſſeſſes in the ſcale, depends in a great meaſure on its object: it poſſeſſes a low place when founded on external properties merely; and is mean when beſtowed on a perſon of inferior rank without any extraordinary qualification: but when founded on the more elevated internal properties, it aſſumes a conſiderable degree of dignity. The ſame is the caſe of friendſhip. When gratitude is warm, it animates the mind; but it ſcarce riſes to dignity. Joy beſtows dignity when it proceeds from an elevated cauſe.

If we can depend upon induction, dignity is not a property of any diſagreeable paſſion: one is ſlight, another ſevere; one depreſſes the mind, another animates it; but there is no elevation, far leſs dignity, in any of them. Revenge, in particular, though it enflame and ſwell the mind, is not accompanied with dignity, not even with elevation: it is not however felt as mean or groveling, unleſs when it takes indirect meaſures for gratification. Shame and remorſe, though they ſink the ſpirits, are not mean. Pride, a diſagreeable paſſion, beſtows no dignity in the eye of a ſpectator. Vanity always appears mean; and extremely ſo where founded, as commonly happens, on trivial qualifications.

We proceed to the pleaſures of the underſtanding, which poſſeſs a high rank in point of dignity. Of this every one will be ſenſible, when he conſiders the important truths that have been laid open by ſcience; ſuch as general theorems, and the general laws that govern the material and moral worlds. The pleaſures of the underſtanding are ſuited to man as a rational and contemplative being, and they tend not a little to ennoble his nature; even to the Deity he ſtretcheth his contemplations, which, in the diſcovery of infinite power, wiſdom, and benevolence, afford delight of the moſt exalted kind. Hence it appears, that the fine arts, ſtudied as a rational ſcience, afford entertainment of great dignity; ſuperior far to what they afford as a ſubject of taſte merely.

But contemplation, however in itſelf valuable, is chiefly reſpected as ſubſervient to action; for man is intended to be more an active than a contemplative being. He accordingly ſhows more dignity in action than in contemplation: generoſity, magnanimity, heroiſm, raiſe his character to the higheſt pitch: theſe beſt expreſs the dignity of his nature, and advance him nearer to divinity than any other of his attributes.

Having endeavoured to aſſign the efficient cauſe of dignity and meanneſs, by unfolding the principle on which they are founded, we proceed to explain the final cauſe of the dignity or meanneſs beſtowed upon the ſeveral particulars above-mentioned, beginning with corporeal pleaſures. Theſe, as far as uſeful, are, like juſtice, fenced with ſufficient ſanctions to prevent their being neglected: hunger and thirſt are painful ſenſations; and we are incited to animal love by a vigorous propenſity: were corporeal pleaſures dignified over and above with a place in a high claſs, they would infallibly ſibly overturn the balance of the mind, by outweighing the ſocial affections. This is a ſatisfactory final cauſe for refuſing to theſe pleaſures any degree of dignity: and the final cauſe is not leſs evident of their meanneſs, when they are indulged to exceſs. The more refined pleaſures of external ſenſe, conveyed by the eye and the ear from natural objects and from the fine arts, deſerve a high place in our eſteem, becauſe of their ſingular and extenſive utility: in ſome caſes they riſe to a conſiderable dignity; and the very loweſt pleaſures of the kind are never eſteemed mean or groveling. The pleaſure ariſing from wit, humour, ridicule, or from what is ſimply ludicrous, is uſeful, by relaxing the mind after the fatigue of more manly occupation: but the mind, when it ſurrenders itſelf to pleaſure of that kind, loſes its vigour, and ſinks gradually into ſloth. The place this pleaſure occupies in point of dignity, is adjuſted to theſe views: to make it uſeful as a relaxation, it is not branded with meanneſs; to prevent its uſurpation, it is removed from that place but a ſingle degree: no man values himſelf for that pleaſure, even during gratification; and if it have engroſſed more of his time than is requiſite for relaxation, he looks back with ſome degree of ſhame.

In point of dignity, the ſocial emotions riſe above the ſelfiſh, and much above thoſe of the eye and ear: man is by his nature a ſocial being; and to qualify him for ſociety, it is wiſely contrived, that he ſhould value himſelf more for being ſocial than ſelfiſh.

The excellency of man is chiefly diſcernible in the great improvements he is ſuſceptible of in ſociety: theſe, by perſeverance, may be carried on progreſſively, above any aſſignable limits; and even abſtracting from revelation, there is great probability, that the progreſs begun here will be completed in ſome future ſtate. Now, as all valuable improvements proceed from the exerciſe of our rational faculties, the Author of our nature, in order to excite us to a due uſe of theſe faculties, hath aſſigned a high rank to the pleaſures of the underſtanding: their utility, with reſpect to this life as well as a future, intitles them to that rank.

But as action is the aim of all our improvements, virtuous actions juſtly poſſeſs the higheſt of all the ranks. Theſe, we find, are by nature diſtributed into different claſſes, and the firſt in point of dignity aſſigned to actions that appear not the firſt in point of uſe: generoſity, for example, in the ſenſe of mankind is more reſpected than juſtice, though the latter is undoubtedly more eſſential to ſociety; and magnanimity, heroiſm, undaunted courage, riſe ſtill higher in our eſteem: The reaſon of which is explained above.

Dignity, in compoſition. See Oratory, n° 48.

DIGON, an ancient, handſome, rich, and very conſiderable town of France; capital of Burgundy, and of the Digonois; with a parliament, biſhop's ſee, a mint, an univerſity, academy of ſciences, an abbey, and a citadel: moſt part of the churches and public ſtructures are very beautiful, and in one of the ſquares there is an equeſtrian ſtatue of Lewis XIV. It is ſeated in a very pleaſant plain between two ſmall rivers, which produces excellent wine. E. Long. 5. 7. N. Lat. 47. 19.

DIGRESSION. See Oratory, n° 37.

DIGYNIA, (from δις *twice*, and γυνη a *woman*), the name of an order or ſecondary diviſion in each of the firſt 13 claſſes, except the 9th, in Linnæus's ſexual method; conſiſting of plants, which to the claſſic character, whatever it is, add the circumſtance of having two ſtyles or female organs.

DIKE, a ditch, or drain, made for the paſſage of waters.—The word ſeems formed from the verb, to *dig*; tho' others chooſe to derive it from the Dutch, *diik*, a dam, ſea-bank, or wall.

Dike, or *Dyke*, alſo denotes a work of ſtone, timber, or faſcines, raiſed to oppoſe the entrance or paſſage of the waters of the ſea, a river, lake, or the like. —The word comes from the Flemiſh *dyk*, or *diik*, a heap of earth to bound or ſtem the water. Junius and Menage take the Flemiſh to have borrowed their word from the Greek τειχος, *wall*. Guichard derives it from the Hebrew *daghah*.

Dikes are uſually elevations of earth, with hurdles of ſtakes, ſtones, and other matters.

The dike of Rochel is made with veſſels faſtened to the bottom. The dikes of Holland are frequently broke through, and drown large tracts of land.

DILAPIDATION, in law, a waſteful deſtroying or letting buildings, eſpecially parſonage-houſes, &c. run to decay, for want of neceſſary reparation. If the clergy neglect to repair the houſes belonging to their benefices, the biſhop may ſequeſter the profits thereof for that purpoſe. And in theſe caſes, a proſecution may be brought either in the ſpiritual court, or at common law, againſt the incumbent himſelf, or againſt his executor or adminiſtrator.

DILATATION, in phyſics, a motion of the parts of any body, by which it is ſo expanded as to occupy a greater ſpace. This expanſive motion depends upon the elaſtic power of the body; whence it appears that dilatation is different from rarefaction, this laſt being produced by the means of heat.

DILATATORES, in anatomy, a name given to ſeveral muſcles in the human body. See Anatomy, *Table of the Muſcles*.

DILEMMA, in logic, an argument equally concluſive by contrary ſuppoſitions *.

DILIGENCE, in Scots law, ſignifies either that care and attention which parties are bound to give, in implementing certain contracts or truſts, and which varies according to the nature of the contract; as to which, ſee Law, N° clxi. 12, 13. clxxiii. 8. & clxxxi. 18. Or it ſignifies certain forms of law, whereby the creditor endeavours to operate his payment, either by affecting the perſon or eſtate of the debtor; *ibid.* N° clxxi. clxxii.

DILL, in botany. See Anethum.

DILLEMBURG, a town of Germany, in Wetteravia, and capital of a county of the ſame name. It is ſubject to a prince of the houſe of Naſſau, and is ſituated in E. Long. 8. 24. N. Lat. 50. 45.

DILLENGEN, a town of Germany, in the circle of Suabia, with an univerſity, and where the biſhop of Augſburg reſides. It is ſeated near the Danube, in E. Long. 11. 35. N. Lat. 48. 38.

DILUTE. To dilute a body is to render it liquid; or, if it were liquid before, to render it more ſo, by the addition of a thinner thereto. Theſe things thus added, are called *diluents*, or *dilutors*.

DIMENSION, in geometry, is either length,

* See *Logic*, n° 100,101.

breadth, or thickneſs: hence, a line hath one dimenſion, *viz.* length; a ſuperficies two, *viz.* length and breadth; and a body, or ſolid, has three, *viz.* length, breadth, and thickneſs.

DIMINUTION, in architecture, a contraction of the upper part of a column, by which its diameter is made leſs than that of the lower part *.

* See *Architecture*, nº 43.

DIMINUTIVE, in grammar, a word formed from ſome other, to ſoften or diminiſh the force of it, or to ſignify a thing is little in its kind. Thus, *cellule* is a diminutive of *cell*, globule of *globe*, hillock of *hill*.

DINGWEL, a parliament-town of Scotland in the ſhire of Roſs, ſeated on the frith of Cromarty, 15 miles weſt of the town of Cromarty. Near it runs the river Conel, famous for producing pearls. W. Long. 4. 15. N. Lat. 57. 45.

DINNER, the meal taken about the middle of the day.—The word is derived from the French *diſner*, which Du Cange derives from the barbarous Latin *diſnare*. Henry Stephens derives it from the Greek δειϖνειν; and will have it wrote *dipner*. Menage deduces it from the Italian *deſinare*, to dine; and that from the Latin *deſinere*, to leave off work.

It is generally agreed to be the moſt ſalutary to make a plentiful dinner, and to eat ſparingly at ſupper. This is the general practice among us. The French, however, in imitation of the ancient Romans, defer their good cheer to the evening; and Bernardinus Paternus, an eminent Italian phyſician, maintains it to be the moſt wholeſome method, in a treatiſe expreſsly on the ſubject.

The grand Tartar emperor of China, after he has dined, makes publication by his heralds, that he gives leave for all the other kings and potentates of the earth to go to dinner; as if they waited for his leave.

DINOCRATES, a celebrated architect of Macedonia, who rebuilt the temple of Epheſus, when burned by Eroſtratus, with much more magnificence than before. Vitruvius informs us that Dinocrates propoſed to Alexander the Great to convert mount Athos into the figure of a man, whoſe left hand ſhould contain a walled city, and all the rivers of the mount flow into his right, and from thence into the ſea? He alſo conceived a ſcheme for building the dome of the temple of Arſinoe at Alexandria, of loadſtone; that ſhould by its attraction uphold her iron image in the centre, ſuſpended in the air! Projects which at leaſt ſhewed a vaſt extent of imagination.

DIO CASSIUS, a famous Greek hiſtorian, a native of Nicea, a city of Phrygia, was governor of Pergamus and Smyrna, and commanded in Africa and Pannonia. In the year 229, he was raiſed by Alexander Severus to the dignity of conſul; but not being agreeable to the troops, was obliged to retire to the place of his birth, where he ended his days. He compoſed a Roman Hiſtory in Greek, a part of which only has been handed down to us. He is accuſed of partiality againſt Pompey, Cicero, Seneca, and ſeveral other great men. He is chiefly eſteemed for the ſpeeches he puts into the mouths of Agrippa and Mecænas, when Auguſtus adviſed with them whether he ſhould preſerve the empire, or reſtore the ancient government.

DIO *Chryſoſtom*, that is, *Golden Mouth*, a celebrated orator and philoſopher of Greece, in the firſt century, was born at Pruſa in Bithynia. He attempted to perſuade Veſpaſian to quit the empire; was hated by Domitian; but acquired the eſteem of Trajan. This laſt prince took pleaſure in converſing with him, and made him ride with him in his triumphal chariot. There are ſtill extant, 80 of Dio's orations, and ſome other of his works: the beſt edition of which is that of Hermand Samuel Raimarus, in 1750, in folio.

DIOCESE, or DIOCESS the circuit, or extent of the juriſdiction of a BISHOP.—The word is formed from the Greek διοικησις, *government*, *adminiſtration*; formed of διοικεω, which the ancient gloſſaries render *adminiſtro*, *moderor*, *ordino*: hence διοικησις της ϖολεως, the *adminiſtration* or *government of a city*.

DIOCESE is alſo uſed in ancient authors, &c. for the province of a METROPOLITAN.

Diocæſis, διοικησις, was originally a civil government, or prefecture, compoſed of diverſe provinces.

The firſt diviſion of the empire into dioceſes is ordinarily aſcribed to Conſtantine; who diſtributed the whole Roman ſtate into four, *viz.* the dioceſe of Italy, the dioceſe of Illyria, that of the eaſt, and that of Africa. And yet, long time before Conſtantine, Strabo, who wrote under Tiberius, takes notice, lib. xiii. p. 432. that the Romans had divided Aſia into dioceſes; and complains of the confuſion ſuch a diviſion occaſioned in geography, Aſia being no longer divided by people, but by dioceſes, each whereof had a tribunal, or court, where juſtice was adminiſtered. Conſtantine, then, was only the inſtitutor of thoſe large dioceſes, which comprehended ſeveral metropoles and governments; the former dioceſes only comprehending one juriſdiction or diſtrict, or the country that had reſort to one judge, as appears from this paſſage in Strabo, and (before Strabo) from Cicero himſelf, lib. iii. *epiſt. ad famil.* 9. and lib. xiii. *ep.* 67.

Thus, at firſt a province included divers dioceſes; and afterwards a dioceſe came to compriſe divers provinces. In after-times the Roman empire became divided into XIII dioceſes or prefectures; though, including Rome, and the ſuburbicary regions, there were XIV. Theſe XIV dioceſes comprehended 120 provinces: each province had a proconſul, who reſided in the capital or metropolis; and each dioceſe of the empire had a conſul, who reſided in the principal city of the diſtrict.

On this civil conſtitution, the eccleſiaſtical one was afterwards regulated: each dioceſe had an eccleſiaſtical vicar, or primate, who judged finally of all the concerns of the church within his territory.

At preſent there is ſome further alteration: for dioceſe does not now ſignify an aſſemblage of divers provinces; but is limited to a ſingle province under a metropolitan, or more commonly to the ſingle juriſdiction of a biſhop.

Gul. Brito affirms dioceſe to be properly the territory and extent of a baptiſmal or parochial church; whence divers authors uſe the word to ſignify a ſimple pariſh. See PARISH.

DIOCLESIAN, the Roman emperor: ſee (*Hiſtory* of) ROME. His bloody perſecution of the Chriſtians forms a chronological æra, called the *æra of Diocleſian*, or of the martyrs. It was for a long time in uſe in theological writings, and is ſtill followed by the Copts and Abyſſinians. It commenced Aug. 29th, A. D. 284.

DIOCTAHEDRIA, in natural hiſtory, a genus of pellucid and cryſtalliform ſpars, compoſed of two octangular pyramids, joined baſe to baſe, without any intermediate column. Of theſe ſome have long pyramids, others ſhort and ſharp-pointed ones, and others ſhort and obtuſe-pointed ones; the two former ſpecies being found in the Hartz-foreſt, and the laſt in the mines of Cornwall.

DIODON, or SUN-FISH, in ichthyology, a genus belonging to the order of amphibia nantes.

There are three ſpecies, 1. The oblong ſun-fiſh grows to a great bulk: one examined by Sylvianus was abve 100 pounds in weight; and Dr Borlaſe mentions another taken at Plymouth in 1734, that weighed 500. In form it reſembles a bream or ſome deep fiſh cut off in the middle. The mouth is very ſmall, and contains in each jaw two broad teeth, with ſharp edges. The eyes are little; before each is a ſmall ſemilunar aperture; the pectoral fins are very ſmall, and placed behind them. The colour of the back is duſky, and dappled; the belly ſilvery: between the eyes and the pectoral fins are certain ſtreaks pointing downwards. The ſkin is free from ſcales.

When boiled, it has been obſerved to turn into a glutinous jelly, reſembling boiled ſtarch when cold, and ſerved the purpoſes of glue on being tried on paper and leather. The meat of this fiſh is uncommonly rank: it feeds on ſhell-fiſh.

There ſeems to be no ſatisfactory reaſon for the old Engliſh name. Care muſt be taken not to confound it with the ſun-fiſh of the Iriſh *, which differs in all reſpects from this.

* See *Squa-*
us.

2. The mola, or ſhort ſun-fiſh, differs from the former, in being much ſhorter and deeper. The back and the anal fins are higher, and the aperture to the gills not ſemilunar, but oval. The ſituation of the fins are the ſame in both.

Both kinds are taken on the weſtern coaſts of this kingdom, but in much greater numbers in the warmer parts of Europe.—Mr Brunnich informs us, that between Antibes and Genoa, he ſaw one of this ſpecies lie aſleep on the ſurface of the water: a ſailor jumped overboard, and caught it.

e Plate
XXXVI.
g. 8.

3. The levigatus, or globe, is common to Europe and South Carolina. As yet only a ſingle ſpecimen has been diſcovered in our ſeas; taken at Penzance in Cornwall. The length was one foot ſeven: the length of the belly, when diſtended, one foot; the whole circumference in that ſituation two feet ſix. The form of the body is uſually oblong; but when alarmed, it has the power of inflating the belly to a globular ſhape of great ſize. This ſeems deſigned as a means of defence againſt fiſh of prey: as they have leſs means of laying hold of it; and are beſides terrified by the numbers of ſpines with which that part is armed, and which are capable of being erected on every part. The mouth is ſmall: the irides white, tinged with red: the back from head to tail almoſt ſtraight, or at leaſt very ſlightly elevated; of a rich deep blue colour. It has the pectoral, but wants the ventral fins: the tail is almoſt even, divided by an angular projection in the middle; tail and fins brown. The belly and ſides are white, ſhagreened or wrinkled; and beſet with innumerable ſmall ſharp ſpines, adhering to the ſkin by four proceſſes.

DIODORUS SICULUS, a celebrated hiſtorian, under Julius Cæſar and Auguſtus, was thus named from his being a native of Agyrium in Sicily. He ſpent 50 years in compoſing his *Bibliotheca Hiſtorica*; and travelled into the places he deſcribes, for perfect information. This important work, which he compoſed in Greek, contained 40 books, of which there are only 15 remaining. The ſtyle is clear and neat, and very ſuitable to hiſtory. The beſt edition is that of Amſterdam, 1745, in two volumes, folio.

DIOECIA, (from δις *twice*, and οικια a *houſe* or *habitation*) two houſes. The name of the 22d claſs in Linnæus's ſexual method, conſiſting of plants, which having no hermaphrodite flowers, produce male and female flowers on ſeparate roots. Theſe latter only ripen ſeeds; but require for that purpoſe, according to the ſexualiſts, the vicinity of a male plant; or the aſperſion, that is, ſprinkling, of the male duſt. From the ſeeds of the female flowers are raiſed both male and female plants. The plants then in the claſs diœcia are all male and female; not hermaphrodite, as in the greater number of claſſes; nor with male and female flowers upon one root, as in the claſs monœcia of the ſame author. See BOTANY, p. 1292.

DIOGENES of Apollonia, in the iſland of Crete, held a conſiderable rank among the philoſophers who taught in Ionia before Socrates appeared at Athens. He was the ſcholar and ſucceſſor of Anaximenes, and in ſome meaſure rectified his maſter's opinion concerning air being the cauſe of all things. It is ſaid, that he was the firſt who obſerved that air was capable of condenſation and rarefaction. He paſſed for an excellent philoſopher, and died about the 450th year before the Chriſtian æra.

DIOGENES the Cynic, a famous philoſopher, was the ſon of a banker of Sinope in Pontus. Being baniſhed with his father for coining falſe money, he retired to Athens, where he ſtudied philoſophy under Antiſthenes. He added new degrees of auſterity to the ſect of the Cynics, and never did any philoſopher carry ſo far a contempt for the conveniencies of life. He was one of thoſe extraordinary men who run every thing to extremity, without excepting even reaſon itſelf; and who confirm the ſaying, that "there is no great genius without a tincture of madneſs." He lodged in a tub; and had no other moveables beſides his ſtaff, wallet, and wooden bowl, which laſt he threw away on ſeeing a boy drink out of the hollow of his hand. He uſed to call himſelf a vagabond, who had neither houſe nor country; was obliged to beg, was ill clothed, and lived from hand to mouth: and yet, ſays Ælian, he took as much pride in theſe things as Alexander could in the conqueſt of the world. He was not indeed a jot more humble than thoſe who are clothed in rich apparel, and fare ſumptuouſly every day. He looked down on all the world with ſcorn; he magiſterially cenſured all mankind, and thought himſelf unqueſtionably ſuperior to all other philoſophers. Alexander one day paid him a viſit, and made him an offer of riches or any thing elſe: but all that the philoſopher requeſted of him was, to ſtand from betwixt the ſun and him. As if he had ſaid, "Do not deprive me of the benefits of nature, and I leave to you thoſe of fortune." The conqueror was ſo affected with the vigour and elevation of his ſoul, as to declare, that “ if he was not Alexander, he would chooſe to be Diogenes :” that is, if he was not in poſſeſſion of all that was pompous and ſplendid in life, he would, like Diogenes, heroically deſpiſe it. Diogenes had great preſence of mind, as appears from his ſmart ſayings and quick repartees; and Plato ſeems to have hit off his true character when he called him a Socrates run mad. He ſpent a great part of his life at Corinth, and the reaſon of his living there was as follows: As he was going over to the iſland of Ægina, he was taken by pirates, who carried him into Crete, and there expoſed him to ſale. He anſwered the crier, who aſked him what he could do, that “ he knew how to command men :” and perceiving a Corinthian who was going by, he ſhewed him to the crier, and ſaid, “ Sell me to that gentleman, for he wants a maſter.” Xeniades, for that was the Corinthian's name, bought Diogenes, and carried him with him to Corinth. He appointed him tutor to his children, and entruſted him alſo with the management of his houſe. Diogenes's friends being deſirous of redeeming him, “ You are fools, (ſaid he); the lions are not the ſlaves of thoſe who feed them, but they are the ſervants of the lions.” He therefore plainly told Xeniades, that he ought to obey him, as people obey their governors and phyſicians. Some ſay, that Diogenes ſpent the remainder of his life in Xeniades's family; but Dion Chryſoſtom aſſerts that he paſſed the winter at Athens, and the ſummer at Corinth. He died at Corinth when he was about 90 years old: but authors are not agreed either as to the time or manner of his death. The following account, Jerom ſays, is the true one. As he was going to the Olympic games, a fever ſeized him in the way; upon which he lay down under a tree, and refuſed the aſſiſtance of thoſe who accompanied him, and who offered him either a horſe or a chariot. “ Go you to the games, (ſays he), and leave me to contend with my illneſs. If I conquer, I will follow you: If I am conquered, I ſhall go to the ſhades below.” He diſpatched himſelf that very night; ſaying, that “ he did not ſo properly die, as get rid of his fever.” He had for his diſciples Oneſicrites, Phocion, Stilpo of Megara, and ſeveral other great men. His works are loſt.

DIOGENES *Laertius*, from Laerta in Cilicia where he was born, was an hiſtorian in the time of Antoninus the philoſopher. He is reputed to have been an epicurean; and wrote ten books of “ The lives of the philoſophers,” which are ſtill extant: they were inſcribed to a learned lady, as he intimates in his life of Plato.

DIOMEDEA, in ornithology, a genus belonging to the order of anſeres. The bill is ſtrait; the ſuperior mandible is crooked at the point, and the lower one is truncated; the noſtrils are oval, open, a little prominent, and placed on the ſides. There are two ſpecies, *viz.* 1. The exulans, has pennated wings, and three toes on each foot. It is the albatros of Edwards; and is found in the ocean betwixt the tropics, and at the Cape of Good Hope. It flies pretty high, feeds upon flying-fiſh, and is about the ſize of a pelican. 2. The demerſa, has no quill-feathers on the wings; and the feet have four toes, connected together by a membrane. It is the black penguin of Edwards, about the ſize of a gooſe, and is found at the Cape of Good Hope.

DIOMEDES, king of Etolia, the ſon of Tydeus, and the moſt valiant of the Grecian heroes, next to Achilles and Ajax, ſignalized himſelf at the ſiege of Troy againſt Æneas and Hector, and carried off the Palladium.

DIONIS (Peter), a famous ſurgeon, born at Paris, diſtinguiſhed himſelf by his ſkill in his profeſſion, and by his works, the principal of which are, 1. A courſe of operations in ſurgery; 2. The anatomy of man; and, 3. A treatiſe on the manner of aſſiſting women in child-birth. He died in 1718.

DIONÆA muscipula, or *Venus's Fly-trap*, in botany, a newly diſcovered ſenſitive plant.

Every one ſkilled in natural hiſtory knows, that the mimoſæ, or ſenſitive plants, cloſe their leaves, and bend their joints, upon the leaſt touch: and this has aſtoniſhed us; but no end or deſign of nature has yet appeared to us from theſe ſurpriſing motions: they ſoon recover themſelves again, and their leaves are expanded as before. But the plant we are now going to deſcribe, ſhews that nature may have ſome view towards its nouriſhment, in forming the upper joint of its leaf like a machine to catch food: upon the middle of this, lies the bait for the unhappy inſect that becomes its prey. Many minute red glands that cover its inner ſurface, and which perhaps diſcharge ſome ſweet liquor, tempt the poor animal to taſte them; and the inſtant theſe tender parts are irritated by its feet, the two lobes riſe up, graſp it faſt, lock the two rows of ſpines together, and ſqueeze it to death. And further, leſt the ſtrong efforts for life, in the creature thus taken, ſhould ſerve to diſengage it, three ſmall erect ſpines are fixed near the middle of each lobe among the glands, that effectually put an end to all its ſtruggles. Nor do the lobes ever open again, while the dead animal continues there. But it is nevertheleſs certain, that the plant cannot diſtinguiſh an animal from a mineral ſubſtance; for, if we introduce a ſtraw or a pin between the lobes, it will graſp it full as faſt as if it was an inſect.—The plant is one of the monogynia order, belonging to the decandria claſs. It grows in America, about 35 deg. N. Lat. in wet ſhady places, and flowers in July and Auguſt. The largeſt leaves are about three inches long, and an inch and half acroſs the lobes: the glands of thoſe expoſed to the ſun are of a beautiful red colour; but thoſe in the ſhade are pale, and inclining to green. The roots are ſquamous, ſending forth but few fibres, and are perennial. The leaves are numerous, inclining to bend downwards, and are placed in a circular order; they are jointed and ſucculent; the lower joint, which is a kind of ſtalk, is flat, longiſh, two-edged, and inclining to heart-ſhaped. In ſome varieties they are ſerrated on the edges near the top. The upper joint conſiſts of two lobes; each lobe is of a ſemi-oval form, with their margins furniſhed with ſtiff hairs like eye-brows, which embrace or lock in each other when they cloſe: this they do when they are inwardly irritated. The upper ſurfaces of theſe lobes are covered with ſmall red glands; each of which appears, when highly magnified, like a compreſſed arbutus berry.—Among the glands, about the middle of each lobe, are three very ſmall erect ſpines. When the lobes incloſe any ſubſtance, they never open again while it continues there. If it can be ſhoved out ſo as not to ſtrain the lobes, they expand again; but if force is uſed to open them, ſo ſtrong has nature formed the ſpring of their fibres, that one of the lobes will generally ſnap off rather than yield. The ſtalk is about ſix inches high, round, ſmooth, and without leaves; ending in a ſpike of flowers. The flowers are milk-white, and ſtand on footſtalks, at the bottom of which is a little painted bractea or flower leaf. The ſoil in which it grows, as appears from what comes about the roots of the plants when they are brought over, is a black, light, mould, intermixed with white ſand, ſuch as is uſually found in our mooriſh heaths. Being a ſwamp plant, a north-eaſt aſpect will be propereſt for it at firſt, to keep it from the direct rays of the ſun; and in winter, till we are acquainted with what cold weather it can endure, it will be neceſſary to ſhelter it with a bell-glaſs, ſuch as is uſed for melons. This ſhould be covered with ſtraw or a mat, in hard froſts. By this means ſeveral of theſe plants have been preſerved through the winter in a very vigorous ſtate. Its ſenſitive quality will be found in proportion to the heat of the weather, as well as the vigour of the plant. Our ſummers are not warm enough to ripen the ſeed; or poſſibly we are not yet ſufficiently acquainted with the culture of it. In order to try further experiments on its ſenſitive powers, ſome of the plants might be placed in pots of light mooriſh earth, and placed in pans of water, in an airy ſtove in ſummer; where the heat of ſuch a ſituation, being like that of its native country, will make it ſurpriſingly active.

DIONYSIA, in Grecian antiquity, ſolemnities in honour of Bacchus, ſometimes called by the general name of *Orgia*; and by the Romans *Bacchanalia*, and *Liberalia*. See BACCHANALIA and BACCHUS.

DIONYSIAN PERIOD. See ASTRONOMY, nº 308.

DIONYSIUS I. from a private ſecretary became general and tyrant of Syracuſe and all Sicily. He was likewiſe a poet; and having, by bribes, gained the tragedy-prize at Athens, he indulged himſelf ſo immoderately at table from exceſs of joy, that he died of the debauch, 386 B. C. but ſome authors relate that he was poiſoned by his phyſicians.

DIONYSIUS II. (his ſon and ſucceſſor) was a greater tyrant than his father: his ſubjects were obliged to apply to the Corinthians for ſuccour; and Timoleon, their general, having conquered the tyrant, he fled to Athens, where he was obliged to keep a ſchool for ſubſiſtence. He died 343 B. C.

DIONYSIUS (Halicarnaſſenſis), a celebrated hiſtorian, and one of the moſt judicious critics of antiquity, was born at Halicarnaſſus; and went to Rome after the battle of Actium, where he ſtaid 22 years, under the reign of Auguſtus. He there compoſed in Greek, his Hiſtory of the Roman Antiquities, in 20 books, of which the firſt 11 only are now remaining. There are alſo ſtill extant ſeveral of his critical works. The beſt edition of the works of this author is that of Oxford, in 1704, in Greek and Latin, by Dr Hudſon.

DIONYSIUS, a learned geographer, to whom is attributed a Periegeſis, or Survey of the Earth, in Greek verſe. Some ſuppoſe that he lived in the time of Auguſtus; but Scaliger and Saumaſius place him under the reign of Severus, or Marcus Aurelius. He wrote many other works, but his Periegeſis is the only one we have remaining; the beſt and moſt uſeful edition of which is that improved with notes and illuſtrations by Hill.

DIONYSIUS (Areopagita), was born at Athens, and educated there. He went afterwards to Heliopolis in Egypt; where, if we may believe ſome writers of his life, he ſaw that wonderful eclipſe which happened at our Saviour's paſſion, and was urged by ſome extraordinary impulſe to cry out, *Aut Deus patitur, aut cum patiente dolet*; "either God himſelf ſuffers, or condoles with him who does." At his return to Athens he was elected into the court of Areopagus, from whence he derived his name of *Areopagite*. About the year 50 he embraced Chriſtianity; and, as ſome ſay, was appointed firſt biſhop of Athens by St Paul. Of his converſion we have an account in the 17th Chapter of the Acts of the Apoſtles.—He is ſuppoſed to have ſuffered martyrdom; but whether under Domitian, Trajan, or Adrian, is not certain. We have nothing remaining under his name, but what there is the greateſt reaſon to believe ſpurious.

DIOPHANTUS, a celebrated mathematician of Alexandria, reputed to have been the inventor of algebra. When he lived, is not known: ſome have placed him before Chriſt, and ſome after, with equal uncertainty. He wrote 13 books of arithmetic; which, the aſtronomer Regiomontanus tells us, are ſtill preſerved in MSS. in the Vatican library: Meziriac's edition of ſeven of theſe books has been ſeveral times reprinted, with notes and illuſtrations.

DIOPTRICS,

THAT part of OPTICS which treats of the laws of refraction, and the effects which the refraction of light has in viſion. The word is originally Greek, formed of δια, *per*, "through," and οπτομαι, *I ſee*.

As this and the other branches of OPTICS are fully treated under the collective name, we ſhall here, 1. Juſt give a ſummary of the general principles of the branch, in a few plain aphoriſms, with ſome preliminary definitions; and, 2. Preſent our readers with a ſet of entertaining experiments illuſtrative of, or dependent upon, thoſe principles.

DEFINITIONS.

1. When a ray of light paſſing out of one medium into another of a different denſity, is turned from that ſtraight line in which it would otherwiſe proceed into one of a different direction, it is ſaid to be refracted. Thus the rays AB, AC, &c. by paſſing out of air into the glaſs BGC, are turned from their natural courſe into that of BF, CF, &c. and are therefore ſaid to be refracted by the lens BGC.

Plate XCIII. fig. 1.

2. Any ſpherical tranſparent glaſs, that converges or diverges the rays of light as they paſs through it, is called a *lens*.

3. Of lenſes there are five ſorts: 1. A plane or ſingle convex lens, which is plane on one ſide, and convex on the other; as AZ, fig. 3. 2. A double convex lens, as B. 3. A plano-concave lens, that is, plane on one

his ſoul, as to declare, that " if he was not Alexander, he would chooſe to be Diogenes :" that is, if he was not in poſſeſſion of all that was pompous and ſplendid in life, he would, like Diogenes, heroically deſpiſe it. Diogenes had great preſence of mind, as appears from his ſmart ſayings and quick repartees; and Plato ſeems to have hit off his true character when he called him a Socrates run mad. He ſpent a great part of his life at Corinth, and the reaſon of his living there was as follows: As he was going over to the iſland of Ægina, he was taken by pirates, who carried him into Crete, and there expoſed him to ſale. He anſwered the crier, who aſked him what he could do, that " he knew how to command men :" and perceiving a Corinthian who was going by, he ſhewed him to the crier, and ſaid, " Sell me to that gentleman, for he wants a maſter." Xeniades, for that was the Corinthian's name, bought Diogenes, and carried him with him to Corinth. He appointed him tutor to his children, and entruſted him alſo with the management of his houſe. Diogenes's friends being deſirous of redeeming him, " You are fools, (ſaid he); the lions are not the ſlaves of thoſe who feed them, but they are the ſervants of the lions." He therefore plainly told Xeniades, that he ought to obey him, as people obey their governors and phyſicians. Some ſay, that Diogenes ſpent the remainder of his life in Xeniades's family; but Dion Chryſoſtom aſſerts that he paſſed the winter at Athens, and the ſummer at Corinth. He died at Corinth when he was about 90 years old: but authors are not agreed either as to the time or manner of his death. The following account, Jerom ſays, is the true one. As he was going to the Olympic games, a fever ſeized him in the way; upon which he lay down under a tree, and refuſed the aſſiſtance of thoſe who accompanied him, and who offered him either a horſe or a chariot. " Go you to the games, (ſays he), and leave me to contend with my illneſs. If I conquer, I will follow you: If I am conquered, I ſhall go to the ſhades below." He diſpatched himſelf that very night; ſaying, that " he did not ſo properly die, as get rid of his fever." He had for his diſciples Oneſicrites, Phocion, Stilpo of Megara, and ſeveral other great men. His works are loſt.

DIOGENES *Laertius*, from Laerta in Cilicia where he was born, was an hiſtorian in the time of Antoninus the philoſopher. He is reputed to have been an epicurean; and wrote ten books of " The lives of the philoſophers," which are ſtill extant: they were inſcribed to a learned lady, as he intimates in his life of Plato.

DIOMEDEA, in ornithology, a genus belonging to the order of anſeres. The bill is ſtrait; the ſuperior mandible is crooked at the point, and the lower one is truncated; the noſtrils are oval, open, a little prominent, and placed on the ſides. There are two ſpecies, *viz.* 1. The exulans, has pennated wings, and three toes on each foot. It is the albatros of Edwards; and is found in the ocean betwixt the tropics, and at the Cape of Good Hope. It flies pretty high, feeds upon flying-fiſh, and is about the ſize of a pelican. 2. The demerſa, has no quill-feathers on the wings; and the feet have four toes, connected together by a membrane. It is the black penguin of Edwards, about the ſize of a gooſe, and is found at the Cape of Good Hope.

DIOMEDES, king of Etolia, the ſon of Tydeus, and the moſt valiant of the Grecian heroes, next to Achilles and Ajax, ſignalized himſelf at the ſiege of Troy againſt Æneas and Hector, and carried off the Palladium.

DIONIS (Peter), a famous ſurgeon, born at Paris, diſtinguiſhed himſelf by his ſkill in his profeſſion, and by his works, the principal of which are, 1. A courſe of operations in ſurgery; 2. The anatomy of man; and, 3. A treatiſe on the manner of aſſiſting women in child-birth. He died in 1718.

DIONÆA MUSCIPULA, or *Venus's Fly-trap*, in botany, a newly diſcovered ſenſitive plant.

Every one ſkilled in natural hiſtory knows, that the mimoſæ, or ſenſitive plants, cloſe their leaves, and bend their joints, upon the leaſt touch: and this has aſtoniſhed us; but no end or deſign of nature has yet appeared to us from theſe ſurpriſing motions: they ſoon recover themſelves again, and their leaves are expanded as before. But the plant we are now going to deſcribe, ſhews that nature may have ſome view towards its nouriſhment, in forming the upper joint of its leaf like a machine to catch food: upon the middle of this, lies the bait for the unhappy inſect that becomes its prey. Many minute red glands that cover its inner ſurface, and which perhaps diſcharge ſome ſweet liquor, tempt the poor animal to taſte them; and the inſtant theſe tender parts are irritated by its feet, the two lobes riſe up, graſp it faſt, lock the two rows of ſpines together, and ſqueeze it to death. And further, leſt the ſtrong efforts for life, in the creature thus taken, ſhould ſerve to diſengage it, three ſmall erect ſpines are fixed near the middle of each lobe among the glands, that effectually put an end to all its ſtruggles. Nor do the lobes ever open again, while the dead animal continues there. But it is nevertheleſs certain, that the plant cannot diſtinguiſh an animal from a mineral ſubſtance; for, if we introduce a ſtraw or a pin between the lobes, it will graſp it full as faſt as if it was an inſect.—The plant is one of the monogynia order, belonging to the decandria claſs. It grows in America, about 35 deg. N. Lat. in wet ſhady places, and flowers in July and Auguſt. The largeſt leaves are about three inches long, and an inch and half acroſs the lobes: the glands of thoſe expoſed to the ſun are of a beautiful red colour; but thoſe in the ſhade are pale, and inclining to green. The roots are ſquamous, ſending forth but few fibres, and are perennial. The leaves are numerous, inclining to bend downwards, and are placed in a circular order; they are jointed and ſucculent; the lower joint, which is a kind of ſtalk, is flat, longiſh, two-edged, and inclining to heart-ſhaped. In ſome varieties they are ſerrated on the edges near the top. The upper joint conſiſts of two lobes; each lobe is of a ſemi-oval form, with their margins furniſhed with ſtiff hairs like eye-brows, which embrace or lock in each other when they cloſe: this they do when they are inwardly irritated. The upper ſurfaces of theſe lobes are covered with ſmall red glands; each of which appears, when highly magnified, like a compreſſed arbutus berry.—Among the glands, about the middle of each lobe, are three very ſmall erect ſpines. When the lobes incloſe any ſubſtance, they never open again while it continues there. If it can be ſhoved out ſo as not to ſtrain the lobes, they expand again; but if force is uſed to open them, ſo ſtrong has nature formed the ſpring of their fibres, that one of the lobes will generally ſnap off rather than yield. The ſtalk is about ſix inches high, round, ſmooth, and without leaves; ending in a ſpike of flowers. The flowers are milk-white, and ſtand on footſtalks, at the bottom of which is a little painted bractea or flower-leaf. The ſoil in which it grows, as appears from what comes about the roots of the plants when they are brought over, is a black, light, mould, intermixed with white ſand, ſuch as is uſually found in our mooriſh heaths. Being a ſwamp plant, a north-eaſt aſpect will be propereſt for it at firſt, to keep it from the direct rays of the ſun; and in winter, till we are acquainted with what cold weather it can endure, it will be neceſſary to ſhelter it with a bell-glaſs, ſuch as is uſed for melons. This ſhould be covered with ſtraw or a mat, in hard froſts. By this means ſeveral of theſe plants have been preſerved through the winter in a very vigorous ſtate. Its ſenſitive quality will be found in proportion to the heat of the weather, as well as the vigour of the plant. Our ſummers are not warm enough to ripen the ſeed; or poſſibly we are not yet ſufficiently acquainted with the culture of it. In order to try further experiments on its ſenſitive powers, ſome of the plants might be placed in pots of light mooriſh earth, and placed in pans of water, in an airy ſtove in ſummer; where the heat of ſuch a ſituation, being like that of its native country, will make it ſurpriſingly active.

DIONYSIA, in Grecian antiquity, ſolemnities in honour of Bacchus, ſometimes called by the general name of *Orgia*; and by the Romans *Bacchanalia*, and *Liberalia*. See BACCHANALIA and BACCHUS.

DIONYSIAN PERIOD. See ASTRONOMY, n° 308.

DIONYSIUS I. from a private ſecretary became general and tyrant of Syracuſe and all Sicily. He was likewiſe a poet; and having, by bribes, gained the tragedy-prize at Athens, he indulged himſelf ſo immoderately at table from exceſs of joy, that he died of the debauch, 386 B. C. but ſome authors relate that he was poiſoned by his phyſicians.

DIONYSIUS II. (his ſon and ſucceſſor) was a greater tyrant than his father: his ſubjects were obliged to apply to the Corinthians for ſuccour; and Timoleon, their general, having conquered the tyrant, he fled to Athens, where he was obliged to keep a ſchool for ſubſiſtence. He died 343 B. C.

DIONYSIUS (Halicarnaſſenſis), a celebrated hiſtorian, and one of the moſt judicious critics of antiquity, was born at Halicarnaſſus; and went to Rome after the battle of Actium, where he ſtaid 22 years, under the reign of Auguſtus. He there compoſed in Greek, his Hiſtory of the Roman Antiquities, in 20 books, of which the firſt 11 only are now remaining. There are alſo ſtill extant ſeveral of his critical works. The beſt edition of the works of this author is that of Oxford, in 1704, in Greek and Latin, by Dr Hudſon.

DIONYSIUS, a learned geographer, to whom is attributed a Periegeſis, or Survey of the Earth, in Greek verſe. Some ſuppoſe that he lived in the time of Auguſtus; but Scaliger and Saumaſius place him under the reign of Severus, or Marcus Aurelius. He wrote many other works, but his Periegeſis is the only one we have remaining; the beſt and moſt uſeful edition of which is that improved with notes and illuſtrations by Hill.

DIONYSIUS (Areopagita), was born at Athens, and educated there. He went afterwards to Heliopolis in Egypt; where, if we may believe ſome writers of his life, he ſaw that wonderful eclipſe which happened at our Saviour's paſſion, and was urged by ſome extraordinary impulſe to cry out, *Aut Deus patitur, aut cum patiente dolet*; "either God himſelf ſuffers, or condoles with him who does." At his return to Athens he was elected into the court of Areopagus, from whence he derived his name of *Areopagite*. About the year 50 he embraced Chriſtianity; and, as ſome ſay, was appointed firſt biſhop of Athens by St Paul. Of his converſion we have an account in the 17th Chapter of the Acts of the Apoſtles.—He is ſuppoſed to have ſuffered martyrdom; but whether under Domitian, Trajan, or Adrian, is not certain. We have nothing remaining under his name, but what there is the greateſt reaſon to believe ſpurious.

DIOPHANTUS, a celebrated mathematician of Alexandria, reputed to have been the inventor of algebra. When he lived, is not known: ſome have placed him before Chriſt, and ſome after, with equal uncertainty. He wrote 13 books of arithmetic; which, the aſtronomer Regiomontanus tells us, are ſtill preſerved in MSS. in the Vatican library: Meziriac's edition of ſeven of theſe books has been ſeveral times reprinted, with notes and illuſtrations.

DIOPTRICS,

THAT part of OPTICS which treats of the laws of refraction, and the effects which the refraction of light has in viſion. The word is originally Greek, formed of δια, *per*, "through," and ωπτομαι, *I ſee*.

As this and the other branches of OPTICS are fully treated under the collective name, we ſhall here, 1. Juſt give a ſummary of the general principles of the branch, in a few plain aphoriſms, with ſome preliminary definitions; and, 2. Preſent our readers with a ſet of entertaining experiments illuſtrative of, or dependent upon, thoſe principles.

DEFINITIONS.

1. When a ray of light paſſing out of one medium into another of a different denſity, is turned from that ſtraight line in which it would otherwiſe proceed into one of a different direction, it is ſaid to be refracted. Thus the rays AB, AC, &c. by paſſing out of air into the glaſs BGC, are turned from their natural courſe into that of BF, CF, &c. and are therefore ſaid to be refracted by the lens BGC.

Plate XCIII. fig. 1.

2. Any ſpherical tranſparent glaſs, that converges or diverges the rays of light as they paſs through it, is called a *lens*.

3. Of lenſes there are five ſorts: 1. A plane or ſingle convex lens, which is plane on one ſide, and convex on the other; as AZ, fig. 3. 2. A double convex lens, as B. 3. A plano-concave lens, that is, plane on one

ſide and concave on the other, as C. 4. A double concave, as D. And, 5. A meniſcus, which is convex on one ſide and concave on the other, as E.

4. The point C, round which the ſpherical ſurface of a lens, as AZ, is deſcribed, is called its *centre;* the the line XY, drawn from that centre perpendicular to its two ſurfaces, is the axis; and the point V, to which the axis is drawn, is the vertex of that lens.

5. When the rays of light that paſs through a ſingle or double convex lens are brought into their ſmalleſt compaſs, that point is the focus of the lens.

6. In optical inſtruments, that lens which is next the object is called the *object-glaſs;* and that next the eye, the *eye glaſs*.

Fig. 13. 7. The diſtance between the line AB, and the perpendicular EF, is called the *angle of incidence*; and the diſtance between the line BD, and the perpendicular EF, is called the *angle of refraction*.

APHORISMS.

1. A ray of light paſſing obliquely out of one medium into another that is denſer, will be refracted toward the perpendicular; as the ray AB, by paſſing out of air into glaſs, is refracted into BF, inclined to the perpendicular AF. On the contrary, a ray paſſing out of a denſer into a rarer medium, will be refracted from the perpendicular; as the ray BC, paſſing out of the glaſs GH into air, is refracted into DI, Fig. 13.

2. The angles of incidence and refraction, when the lines that contain them are all equal, will have a determinate proportion to each other, in the ſame mediums: which between air and water will be as 4 to 3; between air and glaſs, as 3 to 2, nearly; and in other mediums in proportion to their denſities.

3. When an object is viewed through a glaſs whoſe two ſurfaces are parallel, it will appear of its natural dimenſions; its ſituation only being a ſmall matter altered, in proportion to the thickneſs of the glaſs, and the obliquity of the rays.

4. All the rays of light, whether diverging, parallel, or converging, that fall on a ſingle or double convex lens, will meet in a focus behind the glaſs: and the diſtance of that focus will be greateſt in diverging, and leaſt in converging, rays.

5. When parallel or converging rays fall on a ſingle or double concave lens, they will diverge behind it. If they be diverging at their incidence, they will become more ſo by paſſing through it.

6. When an object is viewed thro' two convex lenſes, its apparent length, or diameter, will be to its real length, as the diſtance of the focus of the object-glaſs is to that of the eye-glaſs.

By theſe, and the foregoing aphoriſms we are enabled to account for the various effects of dioptric machines, as refracting teleſcopes, microſcopes, the camera obſcura, &c. See OPTICS.

ENTERTAINING EXPERIMENTS.

I. *Optical illuſions.*

Fig. 4. ON the bottom of the veſſel ABCD, place three pieces of money, as a ſhilling, a half-crown, and crown; the firſt at E, the ſecond at F, and the laſt at G. Then place a perſon at H, where he can ſee no further into the veſſel than I: and tell him, that by pouring water into the veſſel you will make him ſee three different pieces of money; bidding him obſerve carefully whether any money goes in with the water.

Here you muſt obſerve to pour in the water very gently, or contrive to fix the pieces, that they may not move out of their places by its agitation.

When the water comes up to K, the piece at E will become viſible; when it comes up to L, the pieces at E and F will appear; and when it riſes to M, all the three pieces will be viſible.

From what has been ſaid of the refraction of light, the cauſe of this phenomenon will be evident: for while the veſſel is empty, the ray HI will naturally proceed in a ſtraight line: but in proportion as it becomes immerſed in water, it will be neceſſarily refracted into the ſeveral directions NE, OF, PG, and conſequently the ſeveral pieces muſt become viſible.

II. *Optical Augmentation.*

TAKE a large drinking glaſs of a conical figure, that is ſmall at bottom and wide at top; in which put a ſhilling, and fill the glaſs about half full with water: then place a plate on the top of it, and turn it quickly over, that the water may not get out. You will then ſee on the plate, a piece of the ſize of a half crown; and ſomewhat higher up, another piece of the ſize of a ſhilling.

This phenomenon ariſes from ſeeing the piece thro' the conical ſurface of the water at the ſide of the glaſs, and through the flat ſurface at the top of the water, at the ſame time: for the conical ſurface dilates the rays, and makes the piece appear larger; but by the flat ſurface the rays are only refracted, by which the piece is ſeen higher up in the glaſs, but ſtill of its natural ſize. That this is the cauſe will be further evident by filling the glaſs with water; for as the ſhilling cannot be then ſeen from the top, the large piece only will be viſible.

III. *Optical Subtraction.*

Fig. 5. AGAINST the wainſcot of a room fix three ſmall pieces of paper, as A, B, C, at the height of your eye; and placing yourſelf directly before them, ſhut your right eye and look at them with the left; when you will ſee only two of thoſe papers, ſuppoſe A and B: but altering the poſition of your eye, you will then ſee the third and one of the firſt, ſuppoſe A; and by altering your poſition a ſecond time, you will ſee B and C; but never all three of them together.

The cauſe of this phenomenon is, that one of the three pencils of rays that come from theſe objects, falls conſtantly on the optic nerve at D; whereas to produce diſtinct viſion, it is neceſſary that the rays of light fall on ſome part of the retina E, F, G, H. We ſee by this experiment, one of the uſes of having two eyes; for he that has one only, can never ſee three objects placed in this poſition, nor all the parts of one object of the ſame extent, without altering the ſituation of his eye.

IV. *Alternate Illuſion.*

WITH a convex lens of about an inch focus, look attentively at a ſilver ſeal, on which a cipher is engraved. It will at firſt appear cut in, as to the naked eye; but if you continue to obſerve it ſome time, without

changing

Plate XCIII.

changing your ſituation, it will ſeem to be in relief, and the lights and ſhades will appear the ſame as they did before. If you regard it with the ſame attention ſtill longer, it will again appear to be engraved: and ſo on alternately.

If you look off the ſeal for a few moments, when you view it again, inſtead of ſeeing it, as at firſt, engraved, it will appear in relief. If, while you are turned toward the light, you ſuddenly incline the ſeal, while you continue to regard it, thoſe parts that ſeemed to be engraved will immediately appear in relief: and if, when you are regarding theſe ſeeming prominent parts, you turn yourſelf ſo that the light may fall on the right hand, you will ſee the ſhadows on the ſame ſide from whence the light comes, which will appear not a little extraordinary. In like manner the ſhadows will appear on the left, if the light fall on that ſide. If, inſtead of a ſeal, you look at a piece of money, theſe alterations will not be viſible, in whatever ſituation you place yourſelf.

It has been ſuſpected that this illuſion ariſes from the ſituation of the light: and in fact, "I have obſerved, (ſays M. Guyot, from whom this article is taken) that when I have viewed it with a candle on the right, it has appeared engraved; but by changing the light to the left ſide, it has immediately appeared in relief." It ſtill, however, remains to be explained, why we ſee it alternately hollow and prominent, without changing either the ſituation or the light. Perhaps it is in the ſight itſelf that we muſt look for the cauſe of this phenomenon; and this ſeems the more probable, as all theſe appearances are not diſcernable by all perſons.

V. *The Camera Obſcura, or Dark Chamber.*

Fig. 5.

Make a circular hole in the ſhutter of a window, from whence there is a proſpect of the fields, or any other object not too near; and in this hole place a convex glaſs, either double or ſingle, whoſe focus is at the diſtance of five or ſix feet (A). Take care that no light enter the room but by this glaſs: at a diſtance from it, equal to that of its focus, place a paſteboard, covered with the whiteſt paper; which ſhould have a black border, to prevent any of the ſide rays from diſturbing the picture. Let it be two feet and a half long, and 18 or 20 inches high: bend the length of it inwards, to the form of part of a circle, whoſe diameter is equal to double the focal diſtance of the glaſs. Then fix it on a frame of the ſame figure, and put it on a moveable foot, that it may be eaſily fixed at that exact diſtance from the glaſs where the objects paint

Plate XCIII.

themſelves to the greateſt perfection. When it is thus placed, all the objects that are in the front of the window will be painted on the paper, in an inverted poſition (B), with the greateſt regularity and in the moſt natural colours.

If you place a moveable mirror without the window; by turning it more or leſs, you will have on the paper all the objects that are on each ſide of the window (C).

If inſtead of placing the mirror without the window you place it in the room, and above the hole (which muſt then be made near the top of the ſhutter), you may receive the repreſentation on a paper placed horizontally on a table; and draw, at your leiſure, all the objects that are there painted.

Nothing can be more pleaſing than this experiment, eſpecially when the objects are ſtrongly enlightened by the ſun: and not only land-proſpects, but a ſea-port, when the water is ſomewhat agitated, or at the ſetting of the ſun, preſents a very delightful appearance.

This repreſentation affords the moſt perfect model for painters, as well for the tone of colours, as that degradation of ſhades, occaſioned by the interpoſition of the air, which has been ſo juſtly expreſſed by ſome modern painters.

It is neceſſary that the paper have a circular form; for otherwiſe, when the centre of it was in the focus of the glaſs, the two ſides would be beyond it, and conſequently the images would be confuſed. If the frame were contrived of a ſpherical figure, and the glaſs were in its centre, the repreſentation would be ſtill more accurate. If the object without be at the diſtance of twice the focal length of the glaſs, the image in the room will be of the ſame magnitude with the object.

The lights, ſhades, and colours, in the camera obſcura, appear not only juſt, but, by the images being reduced to a ſmaller compaſs, much ſtronger than in nature. Add to this, that theſe pictures exceed all others, by repreſenting the motion of the ſeveral objects: thus we ſee the animals walk, run, or fly; the clouds float in the air; the leaves quiver; the waves roll, &c.; and all in ſtrict conformity to the laws of nature. The beſt ſituation for a dark chamber is directly north, and the beſt time of the day is noon.

VI. *To ſhow the Spots on the Sun's Diſk, by its Image in the Camera Obſcura.*

Put the object-glaſs of a 10 or 12 foot teleſcope into the ſcioptric ball, and turn it about till it be directly oppoſite to the ſun (D). Then place the paſte-

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(A) The diſtance ſhould not be leſs than three feet; for if it be, the images will be too ſmall, and there will not be ſufficient room for the ſpectators to ſtand conveniently. On the other hand, the focus ſhould never be more than 15 or 20 feet, for then the images will be obſcure, and the colouring faint. The beſt diſtance is from 6 to 12 feet.

(B) This inverted poſition of the images may be deemed an imperfection, but it is eaſily remedied: for if you ſtand above the board on which they are received, and look down on it, they will appear in their natural poſition: or if you ſtand before it, and, placing a common mirror againſt your breaſt in an oblique direction, look down in it, you will there ſee the images erect, and they will receive an additional luſtre from the reflection of the glaſs; or place two lenſes, in a tube that draws out; or, laſtly, if you place a large concave mirror at a proper diſtance before the picture, it will appear before the mirror, in the air, and in an erect poſition.

(C) There is another method of making the dark chamber; which is by a ſcioptric ball, that is, a ball of wood, through which a hole is made, in which hole a lens is fixed: this ball is placed in a wooden frame, in which it turns freely round. The frame is fixed to the hole in the ſhutter; and the ball, by turning about, anſwers, in great part, the uſe of the mirror on the outſide of the window. If the hole in the window be no bigger than a pea, the objects will be repreſented without any lens, though by no means ſo diſtinctly, or with ſuch vivid colours.

(D) When the ſun is directly oppoſite to the hole, the lens will itſelf be ſufficient: or by means of the mirror on the outſide of the window, as in Experiment V. the lens will anſwer the purpoſe at any time.

Plate XCIII.

board, mentioned in the laſt experiment, in the focus of the lens; and you will ſee a clear bright image of the ſun, of about an inch diameter, in which the ſpots on the ſun's ſurface will be exactly deſcribed.

As this image is too bright to be ſeen with pleaſure by the naked eye, you may view it thro' a lens whoſe focus is at ſix or eight inches diſtance; which at the ſame time that it prevents the light from being offenſive, will, by magnifying both the image and the ſpots, make them appear to greater advantage.

VII. *To magnify ſmall Objects by means of the Sun's Rays let into a Dark Chamber.*

Let the rays of light that paſs through the lens in the ſhutter be thrown on a large concave mirror, properly fixed in a frame. Then take a ſlip or thin plate of glaſs; and ſticking any ſmall object on it, hold it in the incident rays, at a little more than the focal diſtance from the mirror; and you will ſee, on the oppoſite wall, amidſt the reflected rays, the image of that object, very large, and extremely clear and bright. This experiment never fails to give the ſpectator the higheſt ſatisfaction.

VIII. *The Portable Camera Obſcura.*

The great pleaſure produced by the camera obſcura in the common form, has excited ſeveral to render it more univerſally uſeful by making it portable; eaſily fixed on any ſpot, and adapted to every proſpect. We ſhall not here examine the merits of the various ſorts that have been invented; but content ourſelves with deſcribing one that may have ſome advantages not to be found in others, and which appears to be the invention of M. Guyot.

Fig. 6. Let ABCD be a frame of wood, of two feet long and about 20 inches wide; let its four ſides be two inches and a half thick, and firmly joined together. In a groove formed in this frame place a plate of clear glaſs, E; and if the upper ſide of the glaſs were convex, it would be ſtill better. To each of the corners of this frame join a leg, with a hinge, that it may turn up under the table. To the under part of the frame join four pieces of light wood, as H, which muſt alſo have hinges to fold up; and obſerve, that when they are let down, as in the figure, they muſt cloſely join, by means of hooks, it being quite neceſſary that no light enter the box. For this reaſon, the inſide of the box ſhould be lined with black cloth.

To that juſt deſcribed, there muſt be added a ſmaller box M, in which muſt be an inclined mirror N, and in one of its ſides a moveable tube O, five or ſix inches long. This tube muſt be furniſhed with a convex glaſs, the focus of which, by the reflection of the mirror, muſt reach the glaſs E in the frame. There muſt alſo be a covering of black ſtuff, in form of a tent, to place over the top of the frame, by means of four little poles that go into holes in the corners of it. There muſt be an opening to this tent on the ſide A B, by a curtain to be drawn up; and which you are to let down over you, when you place yourſelf under it; that no light may enter. The three other ſides ſhould hang down ſome inches over the frame.—This camera is, indeed, ſomething more cumberſome than thoſe that have been hitherto invented; and yet, if properly made, it will not weigh more than from 20 to 25 pounds. On the other hand, it is much more convenient; for as the coloured rays of objects paint themſelves on the bottom of the glaſs in the frame, you may draw them without having your hand between the rays and their image.

Plate XCIII.

When you have placed the frame on a ſpot a little elevated, that nothing may intercept the rays from falling on the glaſs in the tube, you fix a ſheet of tranſparent varniſhed paper on the glaſs in the frame, by means of wax at its corners. Then placing yourſelf under the curtain, you trace on the paper all the outlines of the objects there repreſented; and if you think fit, you may alſo mark the extent of the ſhadows. If you want only the outlines, you may lay a thin plate of glaſs on that in the frame, and trace the ſtrokes with a pencil and carmine. After which you muſt dip a ſheet of paper in water, without making it too wet; and ſpreading it lightly over that glaſs, you will have the impreſſion of the deſign there drawn.

Note, By each of theſe methods you will have the objects either in their natural poſition, or reverſed; which will be an advantage when the deſign is to be engraved, and you would have it then appear in the natural poſition. In uſing this machine, you ſhould make choice of thoſe objects on which the ſun then ſhines, as the appearance of the ſhadows add greatly to the beauty of the deſign. There are, however, circumſtances in which it is to be avoided, as when you would paint a riſing or ſetting ſun, &c.

IX. *The Magic Lantern.*

This very remarkable machine, which is now known over all the world, cauſed great aſtoniſhment at its origin. It is ſtill beheld with pleaſing admiration; and the ſpectator very frequently contents himſelf with wondering at its effects, without endeavouring to inveſtigate their cauſe. The invention of this ingenious illuſion is attributed to the celebrated P. Kircher, who has publiſhed, on various ſciences, works equally learned, curious, and entertaining. Its deſign is to repreſent at large, on a cloth or board, placed in the dark, the images of ſmall objects, painted with tranſparent colours on plates of glaſs.

The conſtruction is as follows. Let ABCD be a tin box, eight inches high, ten long, and ſix wide (or any other ſimilar dimenſions). At the top muſt be a funnel E, of four inches in diameter, with a cover F, which, at the ſame time that it gives a paſſage to the ſmoke, prevents the light from coming out of the box. Fig. 7.

On the ſide A C there is a door, by which is adjuſted a concave mirror G, of metal or tin, and of five inches diameter; being part of a ſphere whoſe diameter is 18 inches. This mirror muſt be ſo diſpoſed that it may be puſhed forward or drawn back by means of the handle H, that enters the tin tube I, which is ſoldered to the door. In the middle of the box muſt be placed a low tin lamp K, which is to be moveable. It ſhould have three or four lights, that muſt be at the height of the focus of the mirror G. In the ſide BD, and oppoſite to the mirror, there muſt be an aperture of three inches wide and two inches and a half high; in which is to be fixed a convex glaſs L, of the ſame dimenſion, whoſe focus muſt be from four inches and a half to five inches, ſo that the lamp may be placed both in its focus, and in that of the concave mirror.

Plate XCIII.

Plate XCIII. Fig. 7. On the ſame ſide is to be placed a piece of tin MN, of four inches and a half ſquare, having an opening at the ſides of about four inches and a half high, and a quarter of an inch wide. Through this opening or groove are to paſs the glaſſes, on which are painted the figures that are to be ſeen on the cloth. In this tin piece, and oppoſite to the glaſs L, let there be an aperture of three inches and a quarter long, and two inches and a quarter high; to which muſt be adjuſted a tube O, of the ſame form, and ſix inches long. This tube is to be fixed into the piece MN. Another tube, ſix inches long, and moveable, muſt enter that juſt mentioned, in which muſt be placed two convex lenſes, P and Q: that of P may have a focus of about three inches; and that of Q, which is to be placed at the extremity of the tube, one of 10 or 12 inches. The diſtance between theſe glaſſes is to be regulated by their foci. Between theſe glaſſes there muſt be placed a paſteboard R, in which is an aperture of an inch wide, and 4-5ths of an inch high. By placing this tube farther in or out of the other, the images on the cloth will appear larger or ſmaller.

From what has been ſaid of the preceding machines, the conſtruction of this will be eaſily underſtood. The foci of the concave mirror, and the lens L, meeting in the flame of the lamp, they together throw a ſtrong light on the figures painted on the glaſſes that paſs through the groove MN, and by that means render their colours diſtinct on the cloth. The rays from thoſe glaſſes paſſing through the lens P are collected by the aperture in the paſteboard R, and conveyed to the lens Q, by which they are thrown on the cloth.

The lantern being thus adjuſted, you muſt provide plates of clear glaſs, of 12 or 15 inches long, and three inches wide, which are to be placed in thin frames, that they may paſs freely through the groove MN, after being painted in the manner we ſhall now deſcribe.

Method of Painting the Glaſſes for the Lantern.

Draw on a paper the ſubject you deſire to paint, and fix it at each end to the glaſs. Provide a varniſh with which you have mixed ſome black paint; and with a fine pencil draw on the other ſide of the glaſs, with very light touches, the deſign drawn on the paper. If you are deſirous of making the painting as perfect as poſſible, you ſhould draw ſome of the outlines in their proper colours, provided they are the ſtrongeſt tints of thoſe colours that are uſed. When the outlines are dry, you colour the figures with their proper tints or degradations. Tranſparent colours are moſt proper for this purpoſe, ſuch as carmine, lake, Pruſſian blue, verdigris, &c. and theſe muſt be tempered with a ſtrong white varniſh, to prevent their peeling off. You are then to ſhade them with black mixed with the ſame varniſh, or with biſtre, as you find convenient. You may alſo leave ſtrong lights in ſome parts, without any colours, in order to produce a more ſtriking effect. Obſerve, in particular, not to uſe more than four or five colours, ſuch as blue, red, green, and yellow. You ſhould employ, however, a great variety of tints, to give your painting a more natural air; without which they will repreſent vulgar objects, which are by no means the more pleaſing becauſe they are gawdy.

When the lamp in this lantern is lighted, and, by drawing out the tube to a proper length, the figures painted on the glaſs appear bright and well defined, the ſpectator cannot fail of being highly entertained by the ſucceſſion of natural or groteſque figures that are painted on the glaſſes. This piece of optics may be rendered much more amuſing, and at the ſame time more marvellous, by preparing figures to which different natural motions may be given (E), which every one may perform according to his own taſte; either by movements in the figures themſelves, or by painting the ſubject on two glaſſes, and paſſing them at the ſame time through the groove, as will be ſeen in the next experiment.

X. *To repreſent a Tempeſt by the Magic Lantern.*

Provide two plates of glaſs, whoſe frames are ſo thin that they may both paſs freely through the groove MN, at the ſame time, (fig. 7.)

Fig. 8. On one of theſe glaſſes you are to paint the appearance of the ſea, from the ſlighteſt agitation to the moſt violent commotion. Repreſenting from A to B a calm; from B to C a ſmall agitation, with ſome clouds; and and ſo on to F and G, which ſhould exhibit a furious ſtorm. Obſerve, that theſe repreſentations are not to be diſtinct, but run into each other, that they may form a natural gradation: remember alſo, that great part of the effect depends on the perfection of the painting, and the picturеſque appearance of the deſign.

Fig. 9. On the other glaſs you are to paint veſſels of different forms and dimenſions, and in different directions, together with the appearance of clouds in the tempeſtuous parts.

You are then to paſs the glaſs ſlowly through the groove; and when you come to that part where the ſtorm begins, you are to move the glaſs gently up and down, which will give it the appearance of a ſea that begins to be agitated: and ſo increaſe the motion, till you come to the height of the ſtorm. At the ſame time you are to introduce the other glaſs with the ſhips, and moving that in like manner, you will have a natural repreſentation of the ſea, and of ſhips in a calm and in a ſtorm. As you draw the glaſſes ſlowly back, the tempeſt will ſeem to ſubſide, the ſky grow clear, and the ſhips glide gently over the waves.—By means of two glaſſes diſpoſed in this manner you may likewiſe repreſent a battle, or ſea-fight, and numberleſs other ſubjects, that every one will contrive according to his own taſte. They may alſo be made to repreſent ſome remarkable or ludicrous action between different perſons, and many other amuſements that a lively imagination will eaſily ſuggeſt.

XI. *The Nebulous Magic Lantern.*

The light of the magic lantern, and the colour of images, may not only be painted on a cloth, but alſo reflected by a cloud of ſmoke.

Fig. 10. Provide a box of wood or paſteboard AB, of about four feet high, and of ſeven or eight inches ſquare at bottom, but diminiſhing as it aſcends, ſo that its aperture at top is but ſix inches long, and half an inch wide. At the bottom of this box there muſt be a door that

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(E) There are in the Philoſophical Eſſays of M. Muſchenbroek, different methods of performing all theſe various movements, by ſome mechanical contrivances that are not difficult to execute.

Plate XCIII.

that ſhuts quite cloſe, by which you are to place in the box a chaſing-diſh with hot coals, on which is to be thrown incenſe, whoſe ſmoke goes out in a cloud at the top of the box. It is on this cloud that you are to throw the light that comes out of the lantern, and which you bring into a ſmaller compaſs by drawing out the moveable tube. The common figures will here ſerve. It is remarkable in this repreſentation, that the motion of the ſmoke does not at all change the figures; which appear ſo conſpicuous, that the ſpectator thinks he can graſp them with his hand.

Note, In this experiment ſome of the rays paſſing through the ſmoke, the repreſentation will be much leſs vivid than on the cloth; and if care be not taken to reduce the light to its ſmalleſt focus, it will be ſtill more imperfect.

XII. *To produce the appearance of a Phantom, upon a pedeſtal placed on the middle of a table.*

Fig. 11. INCLOSE a common ſmall magic lantern in a box ABCD, that is large enough to contain alſo an inclined mirror M; which muſt be moveable, that it may reflect the cone of light thrown on it by the lantern, in ſuch a manner that it may paſs out at the aperture made in the top of the box. There ſhould be a flap with hinges to cover the opening, that the inſide of the box may not be ſeen when the experiment is not making. This aperture ſhould likewiſe be oval, and of a ſize adapted to the cone of light that is to paſs thro' it. There muſt be holes made in that part of the box which is over the lantern, to let out the ſmoke; and over that part muſt be placed a chaſing-diſh of an oblong figure, and large enough to hold ſeveral lighted coals. This chaſing-diſh may be incloſed in a painted tin box of about a foot high, and with an aperture at top ſomething like fig. 10. It ſhould ſtand on four ſhort feet, to give room for the ſmoke of the lamp to paſs out. There muſt alſo be a glaſs that will aſcend and deſcend at pleaſure in the vertical groove *ab*. To this glaſs let there be fixed a cord, that, going over a pulley *c*, paſſes out of the box at the ſide CD, by which the glaſs may be drawn up, and will deſcend by its own weight. On this glaſs may be painted a ſpectre, or any other more pleaſing figure. Obſerve that the figures muſt be contracted in drawing, as the cloud of ſmoke does not cut the cone of light at right angles, and therefore the figures will appear longer than they do on the glaſs.

After you have lighted the lamp in the lantern, and put the mirror in a proper direction, you place the box or pedeſtal ABCD on a table; and putting the chaſing-diſh in it, throw ſome incenſe in powder on the coals. You then open a trap-door, and let down the glaſs ſlowly; and when you perceive the ſmoke diminiſh you draw up the glaſs, that the figure may diſappear, and ſhut the trap-door. This appearance will occaſion no ſmall ſurpriſe, as the ſpectre will ſeem to riſe gradually out of the pedeſtal, and on drawing up the glaſs will diſappear in an inſtant. Obſerve, that when you exhibit this experiment, you muſt put out all the lights in the room; and the box ſhould be placed on a high table, that the ſpectators may not perceive the aperture by which the light comes out. Tho' we have mentioned a ſmall magic lantern, yet the whole apparatus may be ſo enlarged, that the phantom may appear of a formidable ſize.

Plate XCIII.

XIII. *The Magical Theatre.*

BY making ſome few additions to the magic lantern with the ſquare tube, uſed in Experiment ix. various ſcenes, characters, and decorations of a theatre, may be repreſented in a lively manner. In this experiment it is quite neceſſary to make the lantern much larger than common, that the objects painted on the glaſſes, being of a larger ſize, may be repreſented with greater preciſion, and conſequently their ſeveral characters more ſtrongly marked.

Let there be made a wooden box ABCD, a foot and a half long, 15 inches high, and 10 wide. Fig. 11. Let it be placed on a ſtand EF, that muſt go round it, and by which it may be fixed with two ſcrews to a table. Place over it a tin cover, as in the common lantern. Make an opening in its two narroweſt ſides; in one of which place the tube H, and in the other the tube I: let each of them be ſix inches wide, and five inches high: in each of theſe tubes place another that is moveable, in order to bring the glaſſes, or concave mirror, that are contained in them, to a proper diſtance. In the middle of the bottom of this box place a tin lamp, M; which muſt be moveable in a groove, that it may be placed at a proper diſtance with regard to the glaſſes and mirror: this lamp ſhould have five or ſix lights, each of them about an inch long. At the beginning of the tube H, toward the part N, make an opening of an inch wide, which muſt croſs it laterally: another of three quarters of an inch, that muſt croſs it vertically, and be nearer the box than the firſt; and a third of half an inch, that muſt be before the firſt. The opening made laterally muſt have three or four grooves, the ſecond two, and the third one: that different ſubjects of figures and decorations may be paſſed, either ſidewiſe, aſcending, or deſcending, ſo that the ſcenes of a theatre may be the more exactly imitated (F). Incloſe theſe grooves between two convex rectangular glaſſes, of ſix inches long, and five inches high, and of about 20 inches focus; one of which muſt be placed at O, and the other toward P. Have another tube Q, of about a foot long, which muſt enter that marked H; and at its outward extremity place a lens of about 15 inches focus. There muſt alſo be a third tube R, four inches long, into which that marked I is to enter: to the exterior end of this adjuſt a concave mirror, whoſe focus muſt be at ſeven or eight inches from its reflecting ſurface.

The magic lantern being thus adjuſted, nothing more is neceſſary than to provide glaſſes, painted with ſuch ſubjects as you would repreſent, according to the grooves they are to enter. The lamp is then to be lighted; and placing a glaſs in one of the groves, you draw out the moveable tubes till the object paints itſelf on a cloth to the moſt advantage: by which you determine the diſtance of the lantern, and the ſize of the image. You then make a hole in the partition of that ſize, and fix in it a plate of clear glaſs, over which you paſte a very thin paper, which muſt be varniſhed, that it may be as tranſparent as poſſible.

(F) In the decorations, the clouds and the palaces of the gods ſhould deſcend; caves and infernal palaces ſhould aſcend; earthly palaces, gardens, &c. enter at the ſides.

Plate XCIII.

On this paper are to be exhibited the images of all thoſe objects, that, by paſſing ſucceſſively through the grooves, are to repreſent a theatric entertainment. The exhibition will be very agreeable; becauſe the magic lantern being concealed behind the partition, the cauſe of the illuſion cannot by any means be diſcovered.

In order to ſhow more clearly in what manner a ſubject of this ſort ſhould be painted, and the glaſſes diſpoſed, we will here make choice of the ſiege of Troy for a theatric ſubject; in which will be found all the incidents neceſſary to the exhibition of any other ſubject whatever.—In the firſt act, the theatre may repreſent, on one ſide, the ramparts of Troy; toward the back part, the Grecian camp; and at a further diſtance, the ſea, and the iſle of Tenedos. We will ſuppoſe the time to be that when the Greeks feigned to raiſe the ſiege; and embarked, leaving behind them the wooden horſe, in which were contained the Grecian ſoldiers.—On a glaſs, therefore, of the ſame width with the aperture made in the ſide AC of the box, you are to paint a deep blue curtain, lightly charged with ornaments, quite tranſparent. This glaſs is to be placed in the firſt vertical groove; ſo that by letting it gently down, its image may appear to riſe in the ſame manner as the curtain of a theatre. All the glaſſes that are to aſcend or deſcend muſt be bordered with thin pieces of wood, and ſo exactly fill the grooves, that they may not ſlide down of themſelves.—You muſt have ſeveral glaſſes of a proper ſize to paſs through the horizontal grooves, and of different lengths according to the extent of the ſubject. You may paint, on the firſt, the walls of Troy. On the ſecond, the Grecian camp. On the third, the ſea, the iſle of Tenedos, and a ſerene ſky. On the fourth, the Grecian troops by detached figures. On the fifth, other troops, diſpoſed in battalions, and placed at a diſtance. On the ſixth, divers veſſels, which as the glaſs advances in the groove diminiſh in ſize. On the ſeventh, the wooden horſe and Sinon. On the eighth, Trojan men and women.

Theſe glaſſes being properly painted, you place in the horizontal grooves the firſt, ſecond, third, and fourth. Then draw up the curtain, by letting down the glaſs on which it is painted, and draw away gently the fourth glaſs, and after that the ſecond; then advance, very gently, the fifth, that repreſents the embarkment, and paſs it quite through. Next paſs, the oppoſite way, the ſixth, which repreſents the Grecian fleet. The objects painted on the fourth, fifth, and ſixth, quite diſappearing, you are to advance the ſeventh, on which is painted the wooden horſe; and at the ſame time the eighth, where the Trojans will appear to draw the horſe into the city. The curtain is then to be let down, that you may withdraw the ſcenes of the firſt act, and place in the grooves thoſe that are to compoſe the ſecond.—In the ſecond act may be repreſented the interior part of the city of Troy: on one ſide may be ſeen the wooden horſe, and in the back part the temple of Pallas. The glaſſes for this act may be painted in the following manner.—On the firſt, may be palaces and houſes, repreſenting the inſide of a city. On the ſecond, the temple of Pallas in the centre, with a clear night and the moon. In the front may be ſeen the wooden horſe, that the Trojans have placed hear the temple of Pallas. On the third, a troop of Greeks, with Sinon at their head, who are going to open the gates of the city to the Grecians. On the fourth, different troops of armed Greeks; painted on a long glaſs, to afford variety. On the fifth, ſeveral troops of Trojans. On the ſixth, various appearances of fire and ſmoke, ſo diſpoſed, that, this glaſs being drawn up above the others, the objects painted on the firſt glaſs may appear in a conflagration.

Before you draw up the curtain, you ſhould place the firſt and ſecond glaſſes. You then paſs the whole third glaſs ſlowly; a little after, the fourth, on which are painted the different bodies of armed Greeks; and at the ſame time, from the oppoſite ſide, the ſixth glaſs, that repreſents the Trojan troops; obſerving to move them ſlowly both in advancing and retreating, to imitate a combat (G). Then draw up, by degrees, the ſixth, on which are painted the fire, flame, and ſmoke, ſo that the palaces and houſes painted on the firſt glaſs may appear to take fire gradually, and at laſt preſent a general conflagration. After having repreſented theſe incidents with the greateſt attention, you let fall the curtain to prepare for the third act. In this may be repreſented the inſide of Priam's palace; where is ſeen an altar, round which ſeveral Trojan princeſſes appear, who have fled thither for ſafety.—On the firſt glaſs may be painted the palace. On the ſecond, a view of the back part of the palace, with the altar. On the third, Priam with ſeveral Trojan men and women. On the fourth, Pyrrhus, and a troop of Greeks. On the fifth, the ſame actors, with the palace in flames. On the ſixth, a conflagration.—The two firſt glaſſes which are to be drawn up, ſhould be placed before you raiſe the curtain. Then paſs the third; next advance the fourth, which being drawn up, diſcovers on the fifth the palace in flames; then drawing up the ſixth, let down the firſt, that the palace may appear entirely deſtroyed by the conflagration.

The fourth act may repreſent the environs of Troy, with a diſtant proſpect of the ſea. The firſt and third glaſſes of the firſt act may be here uſed; to which may be added a third, repreſenting Eneas bearing his father Anchiſes, followed by his ſon Iulus, and ſome Trojans. With this glaſs may be repreſented the flight of the Trojans, and the embarkment of Eneas; with another glaſs, on which are painted certain veſſels.—To this act the following ſcenes may be added. The cave of Æolus; the back part of the cave; Æolus; the winds; Juno in her chariot.

The fifth act ſhould repreſent the open ſea, with the fleet of Eneas ſailing for Italy.—On the firſt glaſs muſt be painted the ſea, as in the tenth Exper. or elſe the waves ſhould be imitated by another glaſs under the firſt. On the ſecond, the Trojan fleet. On the third, Neptune in his car. On the fourth, the palace of Jupiter. On the fifth, the inſide of the palace; the gods aſſembled in council; with Venus, obtaining leave of Jupiter for Eneas to land in Italy.—After having placed the firſt glaſs, that repreſents a calm ſea, the curtain is raiſed, and the ſecond ſcene is advanced, which contains the Trojan fleet. The firſt is then brought forward, to repreſent a violent tempeſt: then raiſing the third glaſs, Neptune appears, who commands

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(G) He that moves the glaſſes, ſeeing the effect they produce, is the better able to render the repreſentation as natural as poſſible.

mands the waves to be ſtill, which is done by making the tempeſt ſubſide by degrees. The fleet then advances, and paſſes over the whole theatre: preſently after the fourth and fifth ſcenes deſcend, that repreſent Olympus, and finiſh the exhibition.

Note, We muſt here repeat, that if you would repreſent a ſubject of this ſort to advantage, it is quite neceſſary that the glaſſes be well painted: and thoſe that are to be in front, ſhould be in ſtronger and more opaque colours, that the images of thoſe behind may not appear mixed with them, which will be the caſe if they are all equally tranſparent. The glaſſes ſhould alſo be of different lengths; that, ſome being placed before the others are drawn away, their extremities may not be perceived.

The larger theſe ſubjects are repreſented, the better effect they will have: the front of the theatre ſhould appear to be about three feet wide; and if ſome parts of the figures were moveable, it would ſtill add to the variety of the entertainment.

DIOSCOREA, in botany, a genus of the hexandria order, belonging to the diœcia claſs of plants, for which there is no Engliſh name. There are eight ſpecies, of which the only remarkable one is the bulbifera or yam. This hath triangular winged ſtalks, which trail upon the ground, and extend a great way: theſe frequently put out roots from their joints as they lie upon the ground, by which the plants are multiplied. The roots are eaten by the inhabitants of both the Indies; and are particularly ſerviceable in the Weſt India iſlands, where they make the greateſt part of the negroes food. The plant is ſuppoſed to have been brought from the Eaſt to the Weſt Indies; for it has never been obſerved to grow wild in any part of America; but in the iſland of Ceylon, and on the coaſt of Malabar, it grows in the woods, and there are in thoſe places a great variety of ſorts. It is propagated by cutting the root in pieces, obſerving to preſerve an eye in each, as is practiſed in planting potatoes. One plant will produce three or four large roots. The ſkin of theſe roots is pretty thick, rough, unequal, covered with many ſtringy fibres or filaments, and of a violet colour approaching to black. The inſide is white, and of the conſiſtence of red beet. It reſembles the potatoe in its mealineſs, but is of cloſer texture. When raw, the yams are viſcous and clammy: when roaſted or boiled, they afford very nouriſhing food; and are often preferred to bread by the inhabitants of the Weſt Indies, on account of their lightneſs, and facility of digeſtion. When firſt dug out of the ground, the roots are placed in the ſun to dry: after which, they are either put into ſand, dry garrets, or caſks; where, if kept from moiſture, they may be preſerved whole years, without being ſpoiled, or diminiſhed in their goodneſs. The root commonly weighs two or three pounds; though ſome yams have been found upwards of 20 pounds weight.

DIOSCORIDES (Pedacius), a phyſician of Anaxarba, ſince named *Cæſaria*, in Cilicia; lived in Nero's reign, and compoſed ſeven books *de Materia Medica*.

DIOSMA, African spiræa; a genus of the monogynia order, belonging to the pentandria claſs of plants. There are nine ſpecies; of which the moſt remarkable are the hirſuta, with narrow hairy leaves; and the oppoſitifolia, with leaves placed in the form of a croſs. The firſt is a very handſome ſhrub, growing to the height of five or ſix feet: the ſtalks are of a fine coral colour: the leaves come out alternately on every ſide of the branches, and are narrow-pointed and hairy: the flowers are produced in ſmall cluſters at the end of the ſhoots, and are of a white colour. They are ſucceeded by ſtarry ſeed-veſſels having five corners; in each of which corners is a cell, containing one ſmooth, ſhining, oblong, black ſeed: theſe ſeed-veſſels abounds with a reſin which emits a grateful ſcent, as doth alſo the whole plant.—The ſecond ſpecies riſes to the height of three or four feet: the branches are ſlender, and produced from the ſtem very irregularly; the leaves are placed croſs-ways; the flowers are produced at the ends of the branches, between the leaves: the plants continue a long time in flower, and make a fine appearance when they are intermixed with other exotics in the open air. Both ſpecies are propagated by cuttings; which may be planted during any of the ſummer-months in pots, and plunged into a moderate hotbed, where they ſhould be ſhaded from the ſun, and frequently watered. In about two months they will have taken root; when each ſhould be tranſplanted into a ſmall pot where they are to remain; but during winter, like moſt other exotic plants, they muſt be preſerved in a green-houſe.

DIOSPYROS, the Indian date-plumb; a genus of the diœcia order, belonging to the polygamia claſs of plants. There are two ſpecies. 1. The lotus is ſuppoſed to be a native of Africa, from whence it was tranſplanted into ſeveral parts of Italy, and alſo into the ſouth of France. The fruit of this tree is ſuppoſed to be the lotus with which Ulyſſes and his companions were inchanted. In the warm parts of Europe this tree grows to the height of 30 feet. In the botanic garden at Padua, there is one very old tree which has been deſcribed by ſome of the former botaniſts under the title of *guaiacum patavinum*. This tree produces plenty of fruit every year; from the ſeeds of which many plants have been raiſed. 2. The virginiana, piſhamin, perſimon, or pitchumon plumb, is a native of America, but particularly of Virginia and Carolina. The ſeeds of this ſort have been frequently imported into Britain, and the trees are common in many nurſeries about London. It riſes to the height of 12 or 14 feet; but generally divides into many irregular trunks near the ground, ſo that it is very rare to ſee a handſome tree of this ſort. Though plenty of fruit is produced on theſe trees, it never comes to perfection in this country. In America the inhabitants preſerve the fruit till it is rotten, as is practiſed with medlars in England; when they are eſteemed very pleaſant. Both ſpecies are propagated by ſeeds: and the plants require to be treated tenderly while young; but when they are grown up, they reſiſt the greateſt cold of this country.

DIPHTHONG, in grammar, a double vowel, or the mixture of two vowels pronounced together, ſo as to make one ſyllable.

The Latins pronounced the two vowels in their diphthongs

DIOPTRICS.

Plate XCIII.

Fig. 1.

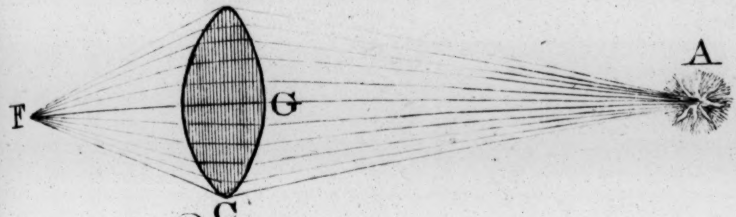

Fig. 3.

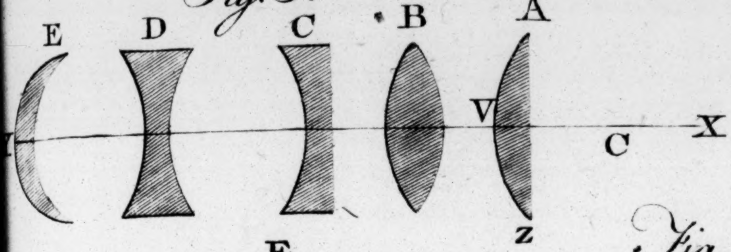

Fig. 4.

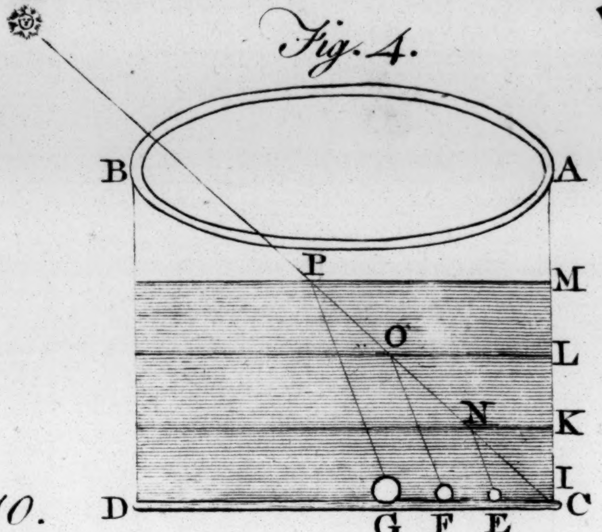
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Fig. 5.

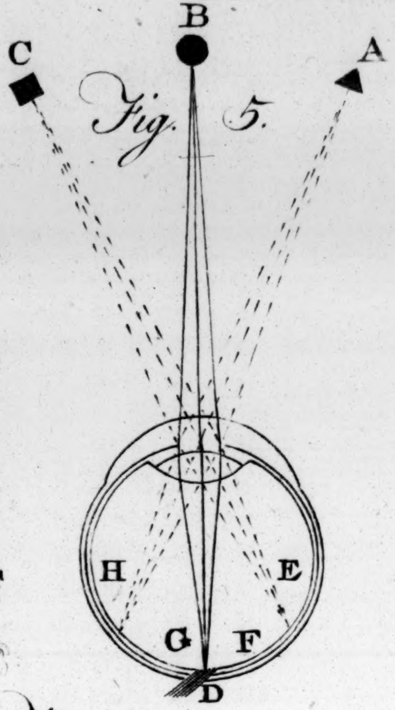

Fig. 13.

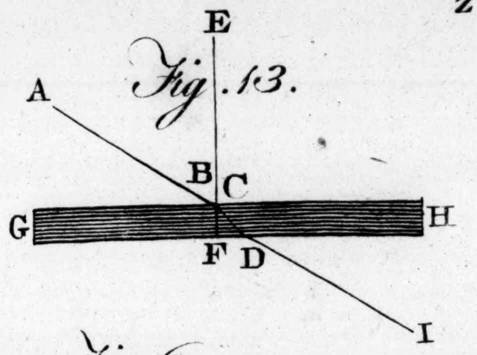

Fig. 10.

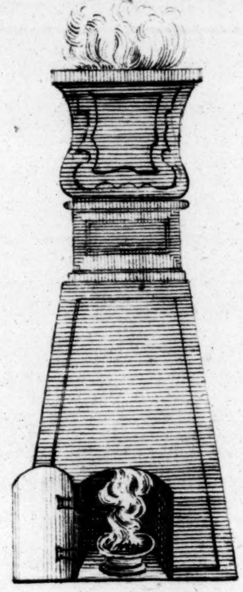

Fig. 11.

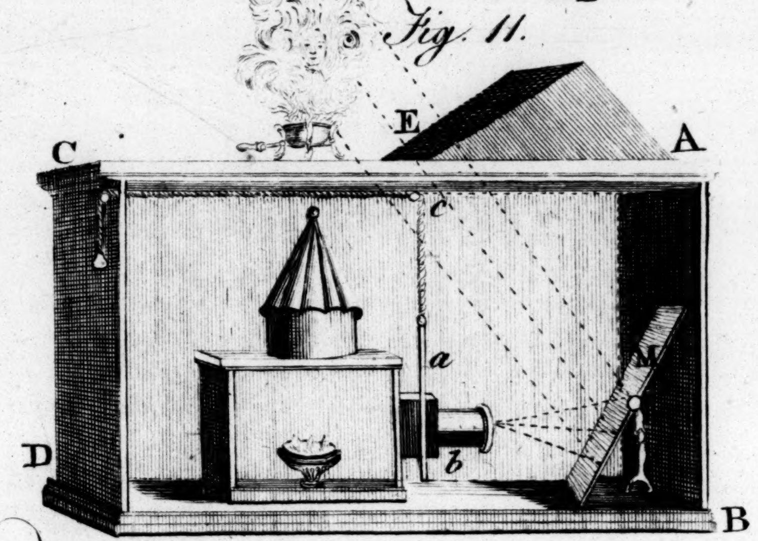

Fig. 6.

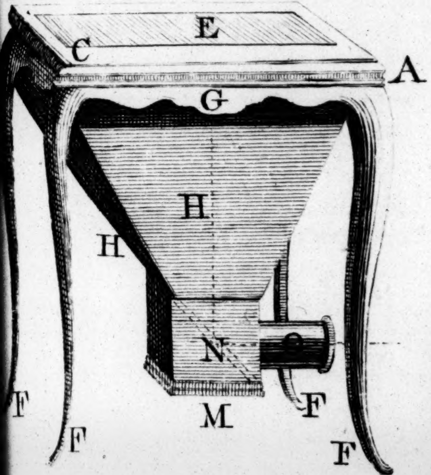
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Fig. 8.

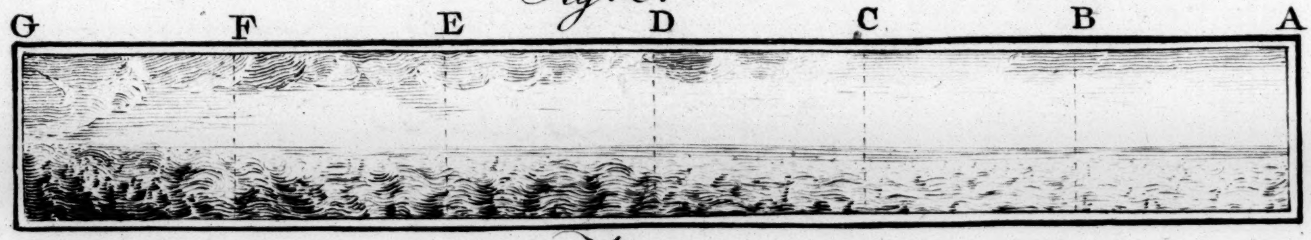


Fig. 9.

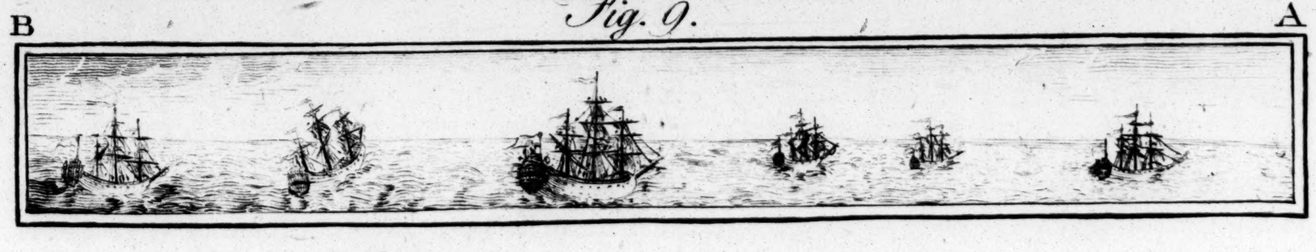
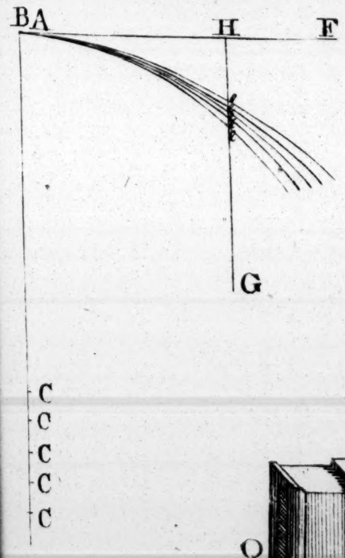


Fig. 2.

DIVISIBILITY.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C
C
C

Fig. 7.

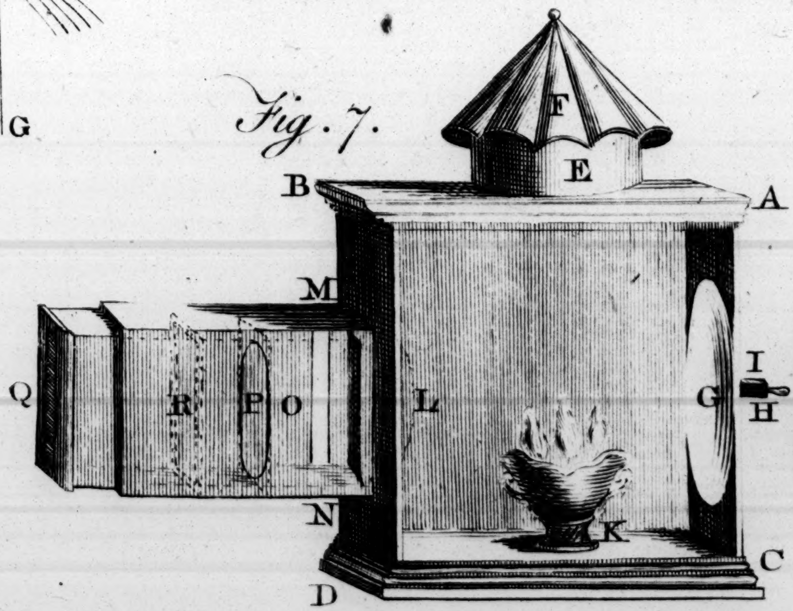
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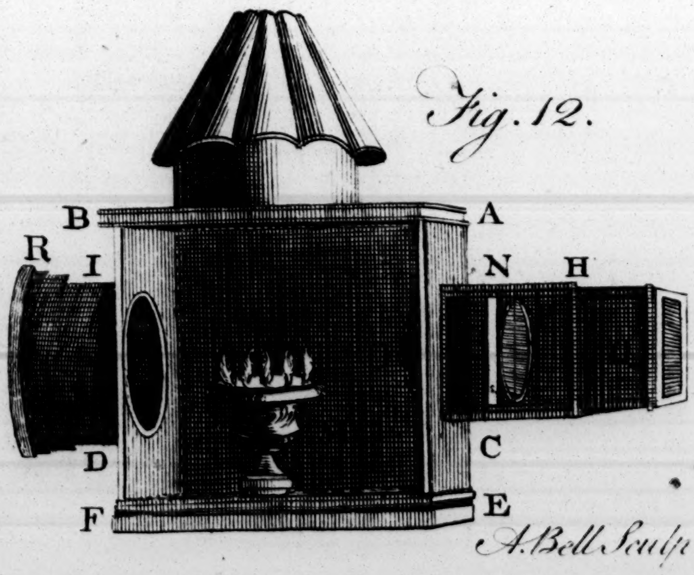
Fig. 12.


B
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R
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H
D
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F
E

A. Bell Sculp^t

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thongs ae or æ, oe or œ, much as we do; only that the one was heard much weaker than the other, tho' the diviſion was made with all the delicacy imaginable. Diphthongs, with regard to the eyes, are diſtinguiſhed from thoſe with regard to the ears: In the former, either the particular ſound of each vowel is heard in the pronunciation; or the ſound of one of them is drowned; or, laſtly, a new ſound, different from either, reſults from both: the firſt of theſe only are real diphthongs, as being ſuch both to the eye and ear. Diphthongs with regard to the ear are either formed of two vowels meeting in the ſame ſyllable, or whoſe ſounds are ſeverally heard; or of three vowels in the ſame ſyllable, which only afford two ſounds in the pronunciation.

Engliſh diphthongs, with regard to the eye and ear, are *ai*, *au*, *ea*, *ee*, *oi*, *oo*, *ou*. Improper Engliſh diphthongs, with regard to the eye only, are *aa*, *ea*, *eo*, *eu*, *ie*, *ei*, *oa*, *oe*, *ue*, *ui*.

DIPLOE, in anatomy, the ſoft meditullium, or medullary ſubſtance, which lies between the two laminæ of the bones of the CRANIUM.

DIPLOMA. See DIPLOMATICS.

In a peculiar ſenſe, it is uſed for an inſtrument or licence given by colleges, ſocieties, &c. to a clergyman to exerciſe the miniſterial function, or to a phyſician to practiſe the profeſſion, &c. after paſſing examination, or admitting him to a degree.

elſield's
lements.

DIPLOMATICS, the ſcience of diplomas, or of ancient literary monuments, public documents, &c. It does not, however, nor can it, abſolutely extend its reſearches to antiquity; but is chiefly confined to the middle age, and the firſt centuries of modern times. For though the ancients were accuſtomed to reduce their contracts and treaties into writing; yet they graved them on tables, or covered them over with wax, or braſs, copper, ſtone, or wood, &c. And all that in the firſt ages were not traced on braſs or marble, has periſhed by the length of time, and the number of deſtructive events.

1. The word *diploma* ſignifies, properly, a letter or epiſtle, that is folded in the middle, and that is not open. But, in more modern times, the title has been given to all ancient epiſtles, letters, literary monuments, and public documents, and to all thoſe pieces of writing which the ancients called *Syngrapha*, *Chirographa*, *Codicilli*, &c. In the middle age, and in the diplomas themſelves, theſe writings are called *Litteræ*, *Præcepta*, *Placita*, *Chartæ indicula*, *Sigilla*, and *Bullæ*; as alſo *Panchartæ*, *Pantochartæ*, *Tractoriæ*, *Deſcriptiones*, &c. The originals of theſe pieces are named *Examplaria*, or *Autographa*, *Chartæ authenticæ*, *Originalia*, &c. and the copies, *Apographa*, *Copiæ*, *Particulæ*, and ſo forth. The collections that have been made of them, are called *Chartaria* and *Chartulia*. The place where theſe papers and documents were kept, the ancients named *Scrinia*, *Tabularium*, or *Ærarium*, words that were derived from the tables of braſs, and, according to the Greek idiom, *Archeium* or *Archivum*.

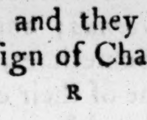
2. In order to underſtand the nature of theſe ancient papers, diplomas, and manuſcripts, and to diſtinguiſh the authentic from the counterfeit, it is neceſſary to know that the paper of the ancients came from Egypt, and was formed of thin leaves or membranes, taken from the branches of a tree named *Papyrus*, or *Biblum Ægyptiacum*, and which were paſted one over the other with the ſlime of the Nile, and were preſſed and poliſhed with a pumice-ſtone. This paper was very ſcarce; and it was of various qualities, forms, and prices, which they diſtinguiſhed by the names of *charta hieratica*, *luria*, *auguſta*, *amphitheatrica*, *ſaitica*, *tanirica*, *emporetica*, &c. They cut this paper into ſquare leaves, which they paſted one to the other, in order to make rolls of them: from whence an entire book was called *volumen*, from *volvendo*; and the leaves of which it conſiſted, *paginæ*. Sometimes, alſo, they paſted the leaves all together by one of their extremities, as is now practiſed in binding; by this method they formed the back of a book, and theſe the learned call *codices*. They rolled the volume round a ſtick, which they named *umbilicus*; and the two ends that came out beyond the paper, *cornua*. The title, wrote on parchment, in purple characters, was joined to the laſt ſheet, and ſerved it as a cover. They made uſe of all ſorts of ſtrings or ribbands, and even ſometimes of locks, to cloſe the book; and ſometimes alſo it was put into a caſe. But there is not now to be found, in any library or cabinet whatever, any one of theſe volumes. We have been aſſured, however, by a traveller, that he had ſeen ſeveral of them in the ruins of Herculaneum; but ſo damaged, the paper ſo ſtiff and brittle, by the length of time, that it was impoſſible to unrol them, and conſequently to make any uſe of them; for on the firſt touch they fell into ſhatters. We ſhall ſpeak hereafter of thoſe books they call *codices*.

3. We are ignorant of the preciſe time when our modern paper was invented; and when they began to make uſe of pens in writing, inſtead of the ſtalks of reeds. The ink that the ancients uſed, was not made of vitriol and galls, like the modern, but of ſoot. Sometimes alſo they wrote with red ink made of vermilion; or in letters of gold, on purple or violet parchment. It is not difficult for thoſe whoſe apply themſelves to this ſtudy, to diſtinguiſh the parchment of the ancients from that of the moderns, as well as their ink and various exterior characters: but that which beſt diſtinguiſhes the original from the counterfeit, is the writing or character itſelf; which is ſo diſtinctly different from one century to another, that we may tell with certainty, within about 40 or 50 years, when any diploma was written. There are two works which furniſh the cleareſt lights on this matter, and which may ſerve as ſure guides in the judgments we may have occaſion to make on what are called ancient diplomas. The one is the celebrated treatiſe on the Diplomatic, by F. Mabillon; and the other, the firſt volume of the Chronicon Gotvicenſe. We there find ſpecimens of all the characters, the flouriſhes, and different methods of writing, of every age. For theſe matters, therefore, we muſt refer our readers to thoſe authors; and ſhall here only add, that,

4. All the diplomas are wrote in Latin, and conſequently the letters and characters have a reſemblance to each other: but there are certain ſtrokes of the pen which diſtinguiſh not only the ages, but alſo the different nations; as the writings of the Lombards, French, Saxon, &c. The letters in the diplomas are alſo uſually longer, and not ſo ſtrong as thoſe of manuſcripts. There has been alſo introduced a kind of court-hand, of a very diſproportionate length, and the letters of which

which are called *Exiles litteræ, criſpæ ac protractiores.* The firſt line of the diploma, the ſignature of the ſovereign, that of the chancellor, notary, &c. are uſually wrote in this character.

5. The ſignature of a diploma conſiſts either of the ſign of the croſs, or of a monogram or cipher, compoſed of the letters of the names of thoſe who ſubſcribed it. The initial letters of the name, and ſometimes alſo the titles, were placed about this croſs. By degrees the cuſtom changed, and they invented other marks; as for example, the ſign of Charlemagne was thus:



They ſometimes added alſo the dates and epoch of the ſignature, the feaſts of the church, the days of the calendar, and other like matters. The ſucceſſive corruption of the Latin language, the ſtyle and orthography of each age, as well as their different titles and forms; the abbreviations, accentuation, and punctuation, and the various methods of writing the diphthongs; all theſe matters united, form ſo many characters and marks by which the authenticity of a diploma is to be known.

6. The ſeal annexed to a diploma was anciently of white wax, and artfully imprinted on the parchment itſelf. It was afterward pendent from the paper, and incloſed in a box or caſe, which they called *bulla.* There are ſome alſo that are ſtamped on metal, and even on pure gold. When a diploma bears all the characters that are requiſite to the time and place where it is ſuppoſed to be written, its authenticity is not to be doubted: but, at the ſame time, we cannot examine them too ſcrupulouſly, ſeeing that the monks and prieſts of former ages have been very adroit in making of counterfeits; and the more, as they enjoyed the confidence of princes and ſtateſmen, and were even ſometimes in poſſeſſion of their rings or ſeals.

7. With regard to manuſcripts that were wrote before the invention of printing, it is neceſſary, (1.) to know their nature, their eſſential qualities, and matter; (2.) to be able to read them freely, and without error; (3.) to judge of their antiquity by thoſe characters which we have juſt mentioned with regard to the diplomas; and, (4.) to render them of uſe in the ſciences. As there are ſcarce any of the ancient codes now remaining, (ſee par. 2.) wrote on the Egyptian paper, or on wood, ivory, &c. we have only to conſider thoſe that are written on parchment or vellum *(membraneos),* and ſuch as are wrote on our paper *(chartaceos).* The former of theſe are in moſt eſteem. With regard to the character, theſe codes are written either in ſquare and capital letters, or in half ſquare, or round and ſmall letters. Thoſe of the firſt kind are the moſt ancient. There are no intervals between the words, no letters different from the others at the beginning of any word, no points, nor any other diſtinction. The codes which are wrote in letters that are half ſquare, reſemble thoſe we have in Gothic characters, as well for the age as the form of the letters. Such as are wrote in round letters are not ſo ancient as the former, and do not go higher than the ninth or tenth century. Theſe have ſpaces between the words, and ſome punctuation. They are likewiſe not ſo well wrote as the preceding, and are frequently diſfigured with comments. The codes are divided, according to the country, into Lombard, Italian, Gaulic, Franco-Gaulic, Saxon, Anglo-Saxon, &c.

8. In the ancient Greek books, they frequently terminated the periods of a diſcourſe, inſtead of all other diviſion, by lines; and theſe diviſions were called, in Latin, *verſus,* from *vertendo:* for which reaſon theſe lines are ſtill more properly named *verſus* than *lineæ.* At the end of a work, they put down the number of verſes of which it conſiſted, that the copies might be more eaſily collated: and it is in this ſenſe we are to underſtand Trebonius, when he ſays, that the pandects contain 150,000 *pæne verſuum.* Theſe codes were likewiſe *vel probæ vel deterioris notæ,* more or leſs perfect, not only with regard to the calligraphy or beauty of the character, but to the correction of the text alſo.

9. It is likewiſe neceſſary to obſerve, in ancient codes, the abbreviations, as they have been uſed in different centuries. Thus, for example, A. C. D. ſignifies, Aulus Caius Decimus; Ap. Cn. Appius Cneius; Aug. Imp. Auguſtus Imperator. The characters that are called *notæ,* are ſuch as are not to be found in the alphabet; but which, notwithſtanding, ſignify certain words. All theſe matters are explained in a copious manner by Voſſius, and in the Chronicon Gotvicenſe. Laſtly, the learned divide all the ancient codes into *codices minus raros, rariores, editos, & anecdotos.* The critical art is here indiſpenſably neceſſary: its reſearches, moreover, have no bounds; and the more, as the uſe of it augments every day, by the diſcoveries that are made in languages, and by the increaſe of erudition.

DIPONDIUS, in the ſcripture-language, is uſed by St Luke to ſignify a certain coin, which was of very little value: our tranſlation of the paſſage is, *Are not five ſparrows ſold for two farthings?* In St Matthew, who relates the ſame thing, we read, *Are not two ſparrows ſold for a farthing?*

DIPPING, among miners, ſignifies the interruption, or breaking off, of the veins of ore; an accident that gives them a great deal of trouble before they can diſcover the ore again.

DIPPING *Needle.* See NEEDLE.

DIPSACUS, TEAZEL; a genus of the monogynia order, belonging to the tetrandia claſs of plants. There are four ſpecies, the moſt remarkable of which is the carduus fullonum, which grows wild in many parts of England. It is of ſingular uſe in raiſing the knap upon woollen cloth. For this purpoſe, the heads are fixed round the circumference of a large broad wheel, which is made to turn round, and the cloth is held againſt them. In the weſt of England, great quantities of the plant are cultivated for the uſe juſt now mentioned. It is propagated by ſowing the ſeeds in March, upon a ſoil that is well prepared. About one peck of ſeed is ſufficient for an acre, as the plants muſt have room to grow; otherwiſe the heads will not be large enough, nor in great quantity. When the plants come up, they muſt be hoed in the ſame manner as is practiſed for turnips, cutting down all the weeds, and thinning the plants to about eight inches diſtance; and as the plants advance, and the weeds begin to grow again, they muſt be hoed a ſecond time, cutting out the plants to a wider diſtance, ſo that they may finally ſtand a foot diſtant from each other. The ſecond year they will ſhoot up heads, which may be cut about the beginning of Auguſt. They are then to be tied up in bunches, and ſet in the ſun if the weather is fair; or if not, in rooms to dry them. The common produce is about 160 bundles or ſtaves upon an acre, which are ſold for one ſhilling each.

The leaves of the common wild teazel, dried, and given in powder or infuſion, are a very powerful remedy againſt flatuſes and crudities in the ſtomach. There is alſo another, though ſomewhat whimſical, uſe for which this plant is famous among the country people in England. If the heads are opened longitudinally, about September or October, there is generally found a ſmall worm in them: one of theſe only is found in each head, whence naturaliſts have named it the *vermis ſolitarius dipſaci*. They collect three, five, or ſeven of theſe, always obſerving to make it an odd number; and, ſealing them up in a quill, give them to be worn as an amulet againſt the ague. This ſuperſtitious remedy is in much higher repute than the bark, in many parts of England.

DIPSAS, a ſort of ſerpent, the bite of which produces ſuch a thirſt as proves mortal; whence its name *dipſas*, which ſignifies thirſty. In Latin it is called *ſitula*, a pail. Moſes ſpeaks of it in Deut. viii. 15.

DIPTOTES, in grammar, are ſuch nouns as have only two caſes, as *ſuppetiæ, ſuppetias*, &c.

DIPTYCHS, in antiquity, a public regiſter in which were written the names of the conſuls and other magiſtrates among the heathens; and among the Chriſtians, they were a ſort of tablets, on one of which were written the names of the deceaſed, and on the other thoſe of the living, patriarchs, biſhops, &c. or thoſe who had done any ſervice to the church, for whom prayers were offered, the deacon reading the names at maſs.

DIRÆ, the general name of the three Furies in the Pagan ſyſtem of theology. They were ſo called, as being *quaſi Deorum iræ*, the miniſters of divine vengeance in puniſhing guilty ſouls after death. They were the daughters of *Night* and *Acheron*. See FURIES.

DIRECT HARMONY. See HARMONY.

DIRECTION, in mechanics, ſignifies the line or path of a body's motion, along which it endeavours to proceed according to the force impreſſed upon it. See MECHANICS.

DIRECTOR, in commercial polity, a perſon who has the management of the affairs of a trading company: thus we ſay, the directors of the India company, South-ſea company, &c. See COMPANY.

The directors are conſiderable proprietors in the ſtocks of their reſpective companies, being choſen by plurality of votes from among the body of proprietors. The Dutch Eaſt India company have 60 ſuch directors; that of France, 21; the Britiſh Eaſt India company has 24, including the chairman, who may be re-elected for four years ſucceſſively. Theſe laſt have ſalaries of 150 l. a-year each, and the chairman 200 l. They meet at leaſt once a-week, and commonly oftener, being ſummoned as occaſion requires.

DIRECTOR, in ſurgery, a grooved probe, to direct the edge of the knife or ſciſſars in opening ſinuſes or fiſtulæ, that by this means the adjacent veſſels, nerves, and tendons, may remain unhurt. See SURGERY.

DIRIBITORES, among the Romans, officers appointed to diſtribute tablets to the people at the comitia. See COMITIA.

DIRIGENT, or DIRECTRIX, a term in geometry, ſignifying the line of motion, along which the deſcribent line or ſurface is carried in the geneſis of any plane or ſolid figure.

DIS, an inſeparable article prefixed to divers words, the effect whereof is either to give them a ſignification contrary to what the ſimple words have, as *diſoblige, diſobey*, &c.; or to ſignify a ſeparation, detachment, &c. as *diſpoſing, diſtributing*.

DIS, a town of Norfolk, ſeated on the river Wavenay, on the ſide of a hill. It is a neat flouriſhing town, with one large church, a Preſbyterian and a Quaker meeting. It has about 600 good houſes, the ſtreets are well paved, pretty wide, and always clean. At the weſt end of the town is a large meer, or lake; but ſo muddy, that the inhabitants can make no other uſe of it but in catching of eels. In the town are carried on manufactories of ſail-cloth, hoſe, and the making of ſtays. E. Long. 1. 16. N. Lat. 52. 25.

DISABILITY, in law, is when a man is diſabled, or made incapable to inherit any lands, or take that benefit which otherwiſe he might have done: and this may happen four ways; by the act of an anceſtor, or of the party himſelf, by the act of God, or of the law. 1. Diſability by the act of the anceſtor, is where the anceſtor is attainted of high treaſon, &c. which corrupts the blood of his children, ſo that they may not inherit his eſtate. 2. Diſability by the act of the party is where a man binds himſelf by obligation, that, upon ſurrender of a leaſe, he will grant a new eſtate to a leſſee; and afterwards he grants over the reverſion to another, which puts it out of his power to perform it. 3. Diſability by the act of God is where a man is *non ſanæ memoriæ*, whereby he is incapable to make any grant, &c. So that, if he paſſeth an eſtate out of him, it may after his death be made void; but it is a maxim in law, "That a man of full age, ſhall never be received to diſable his own perſon." 4. Diſability by the act of the law, is where a man by the ſole act of the law, without any thing by him done, is rendered incapable of the benefit of the law; as an alien born, &c.

ISLANDS OF DISAPOINTMENT, are a cluſter of ſmall iſlands, lying in S. Lat. 14. 10. W. Long. 141. 16. They were diſcovered by Commodore Byron in 1765, who gave them their name from the ſhores affording no anchorage for his ſhips; for which reaſon he was obliged to quit them without landing, or procuring any refreſhments for his crew, who were then languiſhing with ſickneſs. They are inhabited by Indians, who appeared on the beach with ſpears in their hands, that were at leaſt 16 feet long. They every where diſcovered hoſtile intentions, and ſeemed by ſigns to threaten the people in the boat with death if they came aſhore. There are cocoa-trees in great abundance, and the ſhore abounds with turtle.

DISC, in antiquity, a quoit made of ſtone, iron, or copper, five or ſix fingers broad, and more than a foot long, inclining to an oval figure, which they hurled in form of a bowl, to a vaſt diſtance, by the help of a leathern thong tied round the perſon's hand who threw it, and put through a hole in the middle. Homer has made Ajax and Ulyſſes great artiſts at this ſport.

Disc, in aſtronomy, the body and face of the ſun and moon, ſuch as it appears to us on the earth; or the body and face of the earth, ſuch as it appears to a ſpectator in the moon.

Disc, in optics, is the width of the aperture of teleſcopic glaſſes, whatever their form be, whether plain, covex, concave, &c.

DISCERNING, or Discernment, a faculty of the mind whereby it diſtinguiſhes between ideas. See Metaphysics, nº 44, &c.

DISCIPLE, one who learns any thing from another: thus, the followers of any teacher, philoſopher, &c. are called *diſciples*. In the Chriſtian ſenſe, they were followers of Jeſus Chriſt, in general; but in a more reſtrained ſenſe, the diſciples denote thoſe alone who were the immediate followers and attendants on his perſon, of which there were 70 or 72. The names *diſciple* and *apoſtle* are often ſynonymouſly uſed in the goſpel-hiſtory; but ſometimes the apoſtles are diſtinguiſhed from diſciples, as perſons ſelected out of the number of diſciples, to be the principal miniſters of his religion: of theſe there were only 12. The Latins kept the feſtival of the 70 or 72 diſciples on July 15th, and the Greeks on January 4th.

DISCIPLINE, in a general ſenſe, denotes inſtruction and government, as military diſcipline, eccleſiaſtical diſcipline, &c.

Eccleſiaſtical diſcipline conſiſts in putting thoſe laws in execution by which the church is governed, and inflicting the penalties enjoined by them againſt the ſeveral ſorts of offenders that profeſs the religion of Jeſus. The primitive church never pretended to exerciſe diſcipline upon any but ſuch as were within her pale, in the largeſt ſenſe, by ſome act of their own profeſſion; and even upon theſe ſhe never pretended to exerciſe her diſcipline ſo far as to cancel or diſannul their baptiſm: all that ſhe pretended to, was to deprive men of the benefits of external communion, ſuch as public prayer, receiving the euchariſt, and other acts of divine worſhip. The church-diſcipline was only confined to the admonition of the party, and to the leſſer and greater excommunication.

As to the objects of eccleſiaſtical diſcipline, they were all ſuch delinquents as fell into great and ſcandalous crimes after baptiſm.

Diſcipline, in a more peculiar ſenſe, is uſed for the chaſtiſements or bodily puniſhments inflicted on a religious of the Romiſh church who has been found a delinquent; or even for that which the religious voluntarily undergo or inflict on themſelves, by way of mortification.

DISCLAMATION. See Law, Nº clxv. 23.

DISCORD, in general, ſignifies diſagreement, or oppoſition between different perſons or things.

Discord, in muſic, every ſound which, joined with another, forms an aſſemblage diſagreeable to the ear; or rather, every interval whoſe extremes do not coaleſce. Now, as there are no other concords or conſonances, except thoſe which form amongſt themſelves, and with their fundamental ſound, perfect chords, it follows, that every other interval muſt be a real diſſonance or diſcord: even the third and ſixth were reckoned ſuch among the ancients, who excluded them from the number of conſonant chords.

The term *diſſonance*, which is ſynonymous with diſcord, is compounded of two words, the inſeparable prepoſition *dis* and the verb *ſonare*; which, both in a literal and metaphorical ſenſe, ſignifies *diſagreement* or *diſunion*. In reality, that which renders diſſonances grating, is, that the ſounds which form them, far from uniting in the ear, ſeem to repel each other, and are heard each by itſelf as two diſtinct ſounds tho' produced at the ſame time.

This repulſion or violent oſcillation of ſounds is heard more or leſs as the vibrations which produce it are more or leſs frequently coincident. When two vocal ſtrings are gradually tuned, till they approach a conſonant interval, the pulſations become ſlower, as the chord grows more juſt, till at laſt they are ſcarcely heard, if heard at all; from whence it appears certain, that the pleaſure produced in us by harmony reſults from the more or leſs exact and frequent coincidence of vibrations; tho' the reaſon why this coincidence ſhould give pleaſure, more than any other modification or combination of ſounds, appears to us inſcrutable. The agreeable effects of diſſonance in harmony, are no objection to this theory; ſince it is allowed, that the ſenſations excited by diſcord are not in themſelves immediately and neceſſarily pleaſing, but only pleaſe by auricular deception. The ear is ſurprized with the ſhock it receives, without being able to imagine how it ſhould have happened; and in proportion as it is harſh and grating, we feel the pleaſure of returning harmony enhanced, and the diſappointment of being artfully and inſenſibly extricated more agreeable.

The name of *diſſonance*, is given ſometimes to the interval, and ſometimes to each of the two ſounds which form it. But though two ſounds equally form a diſſonance between themſelves, the name is moſt frequently given to that ſound in particular which is moſt extraneous to the chord.

The number of poſſible *diſſonances* is indefinite; but as in muſic we exclude all intervals which are not found in the ſyſtem received, the number of diſſonances is reduced to a very few: beſides, in practice, we can only ſelect from thoſe few, ſuch as are agreeable to the ſpecies, and the mode in which we compoſe; and from this laſt number we muſt exclude ſuch as cannot be uſed conſiſtently with the rules preſcribed. But what are theſe rules? Have they any foundation in nature, or are they merely arbitrary? This is what Rouſſeau, whom in this article we have followed or abandoned as his obſervations appeared uſeful or frivolous, propoſes to inveſtigate as its principal object.

But where does his ſcrutiny terminate? Not in the abolition of the rules preſcribed. Theſe have ſtill ſubſiſted, and will ſtill ſubſiſt, while the frame of man, and the nature of muſic, remain what they are. If then the rules be permanent and univerſal, the principle upon which they are founded may be latent or ambiguous; but the rules themſelves can never be purely arbitrary. How elſe could it happen, that Rameau, D'Alembert, and Rouſſeau, ſhould admit the force and effect of theſe rules, whilſt each of thoſe maſters exerts his whole genius to give a different account of their cauſe and origin? Rouſſeau himſelf, as we have ſeen in a former article, inculcates the neceſſity of diſſonances for the completion of harmony; (ſee Chord). Now if this be true, the eaſieſt methods of introducing and diſmiſſing theſe diſcords muſt be the moſt eligible, and of conſequence the rules for uſing them muſt be eſtabliſhed. It is not then upon the ſubſiſtence or demolition of any particular theory, that they depend. Should we attend to the particular objections which may be urged againſt any ſyſtem whatever; where is the theory which will be found proof to the efforts of ſcepticiſm? After all, the objections of Rouſſeau againſt Rameau's theory, as applied by D'Alembert to the origin of conſonances, (ſee Music, art. 94, 95, 96, 97, 98, 99.) appear to be much more frivolous than the analogies from which he pretends this origin to be deduced. It appears from D'Alembert's expoſition of this theory, that, if not for all, it affords a ſolution for the moſt material and eſſential phenomena in harmony; which is ſufficient for its eſtabliſhment, till another can be found, which gives a rational and conſiſtent account of the whole: a diſcovery which has not yet been made. But, whilſt we acknowledge the futility of Rouſſeau's objections againſt D'Alembert's explication of diſſonances, we muſt at the ſame time admire the ingenuity with which he has deduced them from principles purely mechanical, without departing from the ſyſtem of M. Rameau. This mechanical explication will be found in his Muſical Dictionary, under the article *Diſſonance*.

Discord, (the goddeſs of), in Pagan theology She is repreſented by Ariſtides with fiery eyes, a pale countenance, livid lips, and wearing a dagger in her boſom. It was ſhe who at the marriage of Peleus and Thetis threw in the golden apple, whereon was written "To the faireſt:" which occaſioned a contention between the goddeſſes Juno, Minerva, and Venus; each pretending a title to the apple.—She was likewiſe called *Ate* and *Eris*.

DISCOVERY, in dramatic poetry, a manner of unravelling a plot, or fable, in tragedies, comedies, and romances; wherein, by ſome unforeſeen accident, a diſcovery is made of the name, fortune, quality, &c. of a principal perſon, which were before unknown. See Catastrophe.

DISCOUNT, in commerce, a term among traders, merchants, and bankers. It is uſed by the two former on occaſion of their buying commodities on the uſual time of credit, with a condition that the ſeller ſhall allow the buyer a certain diſcount at the rate of ſo much per cent. per annum, for the time for which the credit is generally given, upon condition that the buyer pays ready money for ſuch commodities, inſtead of taking the time of credit. Traders and merchants alſo frequently taking promiſſory notes for moneys due payable to them or order at a certain time, and ſometimes having occaſion for money before the time is elapſed, procure theſe notes to be diſcounted by bankers before the time of payment. Bills of exchange are alſo diſcounted by bankers; and in this conſiſts one article of the profits of banking. See Bank.

DISCRETE, or disjunct, **Proportion**, is when the ratio of two or more pairs of numbers or quantities is the ſame, but there is not the ſame proportion between all the four numbers. Thus if the numbers 3 : 6 : : 8 : 16 be conſidered, the ratio between 3 : 6 is the ſame as that between 8 : 16, and therefore the numbers are proportional: but it is only diſcretely or diſjunctly, for 3 is not to 6 as 6 to 8; that is, the proportion is broken off between 8 and 3, and is not continued as in the following continual proportionals, 3 : 6 : : 12 : 24.

DISCUS, in antiquity. See Disc.

DISCUS, in botany, the middle part of a radiated compound flower, generally conſiſting of ſmall florets, with a hollow regular petal. It is commonly ſurrounded by large, plain, or flat, tongue-ſhaped petals, in the circumference or margin; as in daiſy, groundſel, and leopards bane: ſometimes the circumference is naked, as in cotton-weed and ſome ſpecies of colts-foot.

Discus *Folii*, the ſurface of the leaf.

DISCUSSION, in matters of literature, ſignifies the clear treating or handling of any particular point, or problem, ſo as to ſhake off the difficulties with which it is embarraſſed: thus we ſay, *ſuch a point was well diſcuſſed*, when it was well treated of and cleared up.

DISCUTIENTS, in medicine, are ſuch remedies, as, by their ſubtilty, diſſolve a ſtagnating or coagulated fluid, and diſſipate the ſame without an external ſolution of continuity.

DISDIACLASTIC crystal, in natural hiſtory, a name given, by Bartholine and ſome others, to the pellucid foſſile ſubſtance more uſually called from the place whence it was firſt brought, *Iſland cryſtal*; tho' properly it is no cryſtal at all, but a fine pellucid ſpar, called by Dr Hill, from its ſhape, *parallelopipedum*. See Island *Cryſtal*.

DISDIAPASON, or **Bisdiapason**, in muſic, a compound concord, deſcribed by F. Parran, in the quadruple ratio of 4 : 1, or 8 : 2.

Disdiapason *Diapente*, a concord in a ſextuple ratio of 1 : 6.

Disdiapason *Semi-Diapente*, a compound concord in the proportion of 16 : 3.

Disdiapason *Ditone*, a compound conſonance in the proportion of 10 : 2.

Disdiapason *Semi-Ditone*, a compound concord in the proportion of 24 : 5.

DISEASE, has been variouſly defined by phyſicians, almoſt every founder of a new ſyſtem having given a definition of *diſeaſe*, differing in ſome reſpects from his predeceſſors. For a particular account of theſe definitions, ſee Medicine.

It has always been obſerved, that people of particular places are ſubject to particular diſeaſes, owing to their manner of living, or to the air and effluvia of the waters. The colder the country, the fewer and leſs violent the diſeaſes in general are. Scheffer tells us, that the Laplanders know no ſuch thing as the plague, or fevers of the burning kind, nor are ſubject to half the diſtempers we have. Some particular diſtempers, however, they are ſubject to more than other nations: thus they have often diſtempers of the eyes, which ariſe from their living continually in ſmoke, or from the glaring of the ſnow which covers their country for a great part of the year. Pleuriſies, and inflammations of the lungs, are alſo very common among them; and the ſmall-pox often rages with great violence. They have one general remedy againſt theſe and all other internal diſeaſes: this is the root of that ſort of moſs which they call *jerth*. They make a decoction of this root in the whey of rein-deer milk, and drink very

Diſeaſe.

large doſes of it warm, to keep up a breathing ſweat. If they cannot get this, they uſe the ſtalks of Angelica boiled in the ſame manner. They have not ſo great an opinion of this remedy as of the former. The quantity of diluting liquors, however, that is drunk on theſe occaſions, moſt probably contributes more to the cure of their diſeaſes, than either of the drugs.

Hoffman has made ſome very curious obſervations on the diſeaſes incident to particular places. He informs us, that ſwellings of the throat have been always common to the inhabitants of mountainous countries. The people of Swiſſerland, Carinthia, Styria, the Hartz-foreſt, Tranſylvania, and the inhabitants of Cronſtadt, he obſerves, are all ſubject to this diſeaſe from the ſame cauſe: which probably is their uſing great quantities of ſnow water; and this, in all probability, derives its pernicious quality from the expulſion of the fixed air contained in it by the congelation, and which is not reſtored by melting.—The French are peculiarly troubled with fevers, worms, hydroceles, and ſarcoceles: and all theſe diſorders are thought to proceed originally from their eating very large quantities of cheſnuts. The Britiſh are peculiarly afflicted with hoarſeneſs, catarrhs, coughs, dyſenteries, conſumptions; the women with the fluor-albus or whites; and children with a particular diſtemper ſcarce known any where elſe, called the *rickets*. In different parts of Italy, different diſeaſes prevail. At Naples, the venereal diſeaſe is more common than in other part of the world. At Venice people are peculiarly ſubject to the bleeding piles. At Rome, tertian agues and lethargic diſtempers are the moſt common; in Tuſcany, the epilepſy or falling-ſickneſs; and in Apulia, they are moſt ſubject to burning fevers, pleuriſies, &c. In Spain, apoplexies are common, as alſo melancholy, hypochondriacal complaints, and bleeding piles. The Dutch are peculiarly ſubject to the ſcurvy, and to the ſtone in the kidneys. Denmark, Norway, Sweden, Pomerania, and Livonia, are all terribly afflicted with the ſcurvy: and it is remarkable, that, in Denmark, Sweden, and Norway, fevers are very common; but in Iceland, Lapland, and Finland, ſuch a diſeaſe is ſcarce ever to be met with; though peripneumonies are very common in theſe places, and likewiſe diſeaſes of the eyes, and violent pains in the head. The Ruſſians and Tartars are afflicted with ulcers made by the cold, of the nature of what we call *chilblains*, but greatly worſe; and in Poland there reigns a diſeaſe called the *plica Polonica*, ſo terribly offenſive and painful, that ſcarce any thing can be worſe. The people of Hungary are very much ſubject to the gout and rheumatiſm: they are alſo more infeſted with lice and fleas than any other people in the world. The Germans in different parts of the empire are ſubject to different reigning diſeaſes. In Weſtphalia, they are peculiarly troubled with peripneumonies and the itch. In Sileſia, Franconia, Auſtria, and other places thereabout, they are very liable to fevers of the burning kind, to bleedings at the noſe, and to other hæmorrhages; alſo to the gout, inflammations, and conſumptions. In Miſnia, they have purple fevers; and the children are peculiarly infeſted with worms. In Greece, Macedonia, and Thrace, there are very few diſeaſes; but what they have are principally burning fevers and pleuriſies. At Conſtantinople the plague always rages; and in the Weſt India iſlands, malignant fevers, and the moſt terrible colics. See MEDICINE.

Diſeaſes
||
Diſpenſary.

DISEASES *of Horſes*. See FARRIERY.

DISEASES *of Dogs*. See DOGS.

DISEASES *of Plants*. See AGRICULTURE, n° 67, *et ſeq.* and BLIGHT, MILDEW, MOSS, &c.

DISFRANCHISING, among civilians, ſignifies the depriving a perſon of the rights and privileges of a free citizen or ſubject.

DISGUISE, a counterfeit habit. Perſons doing unlawful acts in diſguiſe are by our ſtatutes ſometimes ſubjected to great penalties, and even declared felons. Thus by an act, commonly called the *black act*, perſons appearing diſguiſed and armed in a foreſt or grounds incloſed, or hunting deer, or robbing a warren or a fiſh-pond, are declared felons.

DISH, in mining, is a trough made of wood, about 28 inches long, four inches deep, and ſix inches wide; by which all miners meaſure their ore. If any be taken ſelling their ore, not firſt meaſuring it by the bar-maſter's diſh, and paying the king's duty, the ſeller forfeits his ore, and the buyer forfeits for every ſuch offence 40 ſhillings to the lord of the field or farmer.

DISJUNCTIVE, ſomething that ſeparates or diſjoins. Thus, *or*, *neither*, &c. which in connecting a diſcourſe yet ſeparates the parts of it, are called *diſjunctive conjunctions*.

DISLOCATION, the ſame with LUXATION.

DISPART, in gunnery, is the ſetting a mark upon the muzzle-ring, or thereabouts, of a piece of ordnance, ſo that a ſight-line taken upon the top of the baſe-ring againſt the touch-hole, by the mark ſet on or near the muzzle, may be parallel to the axis of the concave cylinder. The common way of doing this, is to take the two diameters of the baſe ring, and of the place where the diſpart is to ſtand, and divide the difference between them into two equal parts, one of which will be the length of the diſpart which is ſet on the gun with wax or pitch, or faſtened there with a piece of twine or marlin. By means of an inſtrument it may be done with all poſſible nicety.

DISPAUPER. A perſon ſuing *in forma pauperis*, is ſaid to be diſpaupered, if, before the ſuit is ended, he has any lands or other eſtate fallen to him, or if he has any thing to make him loſe his privilege. See the article FORMA *Pauperis*.

DISPENSARY, or DISPENSATORY, denotes a book containing the method of preparing the various kinds of medicines uſed in pharmacy. Such are thoſe of Bauderon, Quercetan, Zwelfer, Charas, Bates, Meſue, Salmon, Lemery, Quincy, &c. but the lateſt and moſt eſteemed are the Edinburgh and London diſpenſatories, and Dr Lewis's diſpenſatory.

DISPENSARY, or *Diſpenſatory*, is likewiſe a magazine or office for ſelling medicines at prime coſt to the poor. The college of phyſicians maintain three of theſe in London; one at the college itſelf in Warwick-lane; another in St Peter's alley, Cornhill; and a third in St Martin's lane. Diſpenſaries have alſo been eſtabliſhed in ſeveral of the principal towns in Scotland and England; particularly in Edinburgh, Dundee, and Kelſo; as alſo at Newcaſtle upon Tyne. The firſt of theſe hath given riſen to a courſe of Medical Lectures there, which promiſes to be of much advantage to the ſtudents of medicine: and though the undertaking hath not been patroniſed by people of the firſt rank, yet the ſupport of ſome generous and humane citizens hath made ſome progreſs towards rendering the inſtitution permanent; and ſome hundreds of patients, who could not be admitted into the royal infirmary, have found relief from the medicines charitably beſtowed on them in the diſpenſary.

DISPENSATION, in law, the granting a licenſe of doing ſome certain action that otherwiſe is not permitted.

DISPERSION, in general, ſignifies the ſcattering or diſſipating ſomething. Hence,

Dispersion, in optics, the ſame with the divergency of the rays of light.

Point of Dispersion, in dioptrics, the point from which refracted rays begin to diverge, where their refraction renders them divergent.

Dispersion *of Inflammation*, in medicine and ſurgery, is the removing the inflammation, and reſtoring the inflamed part to its natural ſtate.

DISPLAYED, in heraldry, is underſtood of the poſition of an eagle, or any other bird, when it is erect, with its wings expanded or ſpread forth.

DISPONDEE, in the Greek and Latin poetry, a double ſpondee or foot, conſiſting of four long ſyllables; as mæcēnātēs, conclūdēntēs.

DISPOSITION, in Scots law, is that deed or writing which contains the ſcale or grant of any ſubject: when applied to heritable ſubjects, it in ſome caſes gets the name of *charter*, which differs from a diſpoſition in nothing elſe than a few immaterial forms *.

Char-

Disposition, in architecture, the juſt placing the ſeveral parts of an edifice according to their nature and office. See Architecture, n° 30, &c.

Disposition, in oratory. See Oratory, Part I.

Disposition, in painting. See Painting, n° 14.

Disposition, in human nature.—In every man there is ſomething original, that ſerves to diſtinguiſh him from others, that tends to form a character, and to make him meek or fiery, candid or deceitful, reſolute or timorous, cheerful or moroſe. This original bent, termed *diſpoſition*, muſt be diſtinguiſhed from a *principle*: the latter, ſignifying a law of human nature, makes part of the common nature of man; the former makes part of the nature of this or that man. *Propenſity* is a name common to both; for it ſignifies a principle, as well as a diſpoſition.

DISQUISITION, a ſerious and exact examination into the circumſtances of any affair, in order to diſcourſe clearly about it.

DISSECTION, in anatomy, the cutting up a body, with a view of examining the ſtructure and uſe of the parts. See Anatomy.

Le Gendre obſerves, that the diſſection of a human body, even dead, was held a ſacrilege till the time of Francis I. And the ſame author aſſures us, he has ſeen a conſultation held by the divines of Salamanca, at the requeſt of Charles V. to ſettle the queſtion whether or no it were lawful in point of conſcience to diſſect a human body in order to learn the ſtructure thereof.

DISSEISIN, in law, an unlawful diſpoſſeſſing a perſon of his lands or tenements.

DISSEPIMENTUM, in botany, the name by which Linnæus denominates the partitions which in dry ſeed-veſſels, as capſules and pods (ſiliqua), divide the fruit internally into cells.

DISSENTERS, ſeparatiſts from the ſervice and worſhip of any eſtabliſhed church.

DISSIMILITUDE, unlikeneſs, or want of ſimilitude. See the article Resemblance *and Diſſimilitude*.

DISSIPATION, in phyſics, an inſenſible loſs or conſumption of the minute parts of the body; or, that flux whereby they fly off, and are loſt.

Circle of Dissipation, in optics, is uſed for that circular ſpace upon the retina, which is taken up by one of the extreme pencils or rays iſſuing from an object.

DISSOLVENT, in general, whatever diſſolves or reduces a ſolid body into ſuch minute parts as to be ſuſtained in a fluid.

The principal diſſolvents for metals, are aqua-regia and aqua-fortis; for ſalts, earths, and gums, water; for coral, and other alkaline ſubſtances, diſtilled vinegar or ſpirits of wine. Diſſolvents are the ſame with what the chemiſts call *menſtruums*. See the article Menstruum.

Univerſal Dissolvent. See the article Alkahest.

DISSOLUTION, in phyſics: a diſcontinuation, or analyſis, of the ſtructure of a mixed body; whereby, what was one, and contiguous, is divided into little parts, either homogeneous, or heterogeneous.

Diſſolution, then, is a general name for all reductions of concrete bodies into their ſmalleſt parts, without any regard either to ſolidity or fluidity: though in the uſual acceptation of the word among authors, it is reſtrained to the reduction of ſolid bodies into a ſtate of fluidity; which is more properly expreſſed by *ſolution*, as a branch of *diſſolution*.

According to the opinion of Fr. Tertius de Lanis, Boerhaave, and ſome other learned men, the power or faculty of diſſolving is lodged in fire alone. See Fire and Heat.

According to this hypotheſis, other fluids commonly ſuppoſed diſſolvents, only produce their effect by means of the fiery ſpicula they abound with; and even air, which is judged a powerful menſtruum, owes all its force to the rays of light diffuſed therein.

Sir Iſaac Newton accounts for all diſſolutions, and the ſeveral phenomena thereof, from the great principle of attraction; and, in effect, the phenomena of diſſolution furniſh a great part of the arguments and conſiderations whereby he proves the reality of that principle. The following is a ſpecimen of that great author's way of philoſophiſing on the ſubject of diſſolution.

"When ſalt of tartar diſſolves by lying in a moiſt place, is not this done by an attraction between the particles of the ſalt of tartar, and thoſe of the water which float in the air in form of vapours? and why does not common ſalt, or ſalt-petre, or vitriol, do the like, but for want of ſuch an attraction? And when aqua-fortis, or ſpirit of vitriol, poured on ſteel-filings, diſſolves the filings, with a great heat, and ebullition; is not this heat and ebullition effected by a violent motion of the parts? and does not that motion argue, that the acid parts of the liquor ruſh towards the parts of the metal with violence, and run forcibly into its pores; till, getting between the utmoſt particles and the main maſs of metal, they looſen them therefrom, and ſet them at liberty to float off into the water? When a ſolution of iron in aqua fortis diſſolves lapis calaminaris, and lets go the iron; or a ſolution of copper diſſolves iron immerſed in it, and lets go the copper; or a ſolution of mercury in aqua-fortis poured on iron, copper, tin, or lead, diſſolves the metal, and lets go the mercury; Does not this argue, that the acid particles of the aquafortis are attracted more ſtrongly by the lapis calaminaris than by iron; by iron than by copper; by copper than by ſilver; and by iron, copper, tin, and lead, than by mercury? And is it not for the ſame reaſon, that iron requires more aqua-fortis to diſſolve it than copper, and copper more than the other metals; and that of all metals iron is diſſolved moſt eaſily, and is moſt apt to ruſt; and next after iron, copper? When aqua-fortis diſſolves ſilver, and not gold; and aqua-regia diſſolves gold, and not ſilver; May it not be ſaid, that aqua-fortis is ſubtile enough to penetrate the pores of gold as well as of ſilver, but wants the attractive force to give it entrance; and the ſame of aqua-regia, and ſilver? And when metals are diſſolved in acid menſtruums, and the acids in conjunction with the metal act after a different manner, ſo as that the taſte of the compound is milder than that of the ſimples, and ſometimes a ſweet one; Is it not becauſe the acids adhere to the metallic particles, and thereby loſe much of their activity? And if the acid be in too ſmall a proportion to make the compound diſſoluble in water; will it not, by adhering ſtrongly to the metal, become unactive, and loſe its taſte; and the compound become a taſteleſs earth? for ſuch things as are not diſſoluble by the moiſture of the tongue, are inſipid."

Dr Freind gives us a mechanical account of diſſolution, in the inſtance of ſalt diſſolved in water, which is the moſt ſimple operation that falls under this head. This motion he aſcribes to that attractive force, which is ſo very extenſive in natural philoſophy, that there is no kind of matter but what is under its influence. It may be obſerved, ſays he, that the corpuſcles of ſalts, which are the moſt ſimple of any, are withal very minute, and for their bulk very ſolid; and, therefore, exert a very ſtrong attractive force, which, *cæteris paribus*, is proportional to the quantity of matter. Hence it comes to paſs, that the particles of water are more ſtrongly attracted by the ſaline particles, than they are by one another: the particles of water, therefore, cohering but looſely, and being eaſily moveable, approach the corpuſcles of ſalts, and run, as it were, into their embraces: and the motion of them is quicker, or ſlower, according to their leſs or greater diſtances; the attractive force in all bodies being ſtrongeſt, at the point of contact. Therefore, if ſalt be thrown into the middle of a diſh full of water, we ſhall find the aqueous particles which are in the middle of the diſh ſharp and pungent to the taſte, but the water upon the ſides of the veſſel almoſt inſipid; ſo that, when ſuch a motion once ariſes, the aqueous particles are carried with the ſame force towards the ſalts, and the moment of them is to be eſtimated from the ratio of their weight and celerity conjunctly. By the force of this impulſe, they open to themſelves a paſſage into the pores of the ſalts, which are very numerous; and at length ſo break and divide their texture, that all coheſion of their parts is deſtroyed: hereupon, being ſeparated, and removed to a convenient diſtance from one another, they are diſperſed, and float here and there about the water.

The ſimple diſſolution of ſaline ſubſtances of every kind in water, may indeed be plauſibly enough explained on the hypotheſis of attraction; but where the diſſolution is attended with heat, the emiſſion of vapours, &c. it ſeems neceſſary to ſeek for ſome other principle than mere attraction to ſolve theſe phenomena. When diluted oil of vitriol, for inſtance, is poured upon iron-filings, a great quantity of vapour ariſes, which, if it was attempted to be confined, would certainly break the containing veſſel.—It is impoſſible to imagine any connection between attraction and the emiſſion of a vapour; and what is ſtill more unaccountable, this vapour is *inflammable*, though neither the oil of vitriol nor the iron are ſo by themſelves. Another very ſtrong objection againſt the hypotheſis of attraction may be derived from the phenomena of metallic diſſolutions in general; for they do not diſſolve completely in acids, as ſalts do in water. By diſſolution they are always decompoſed, and cannot be recovered in their proper form without a good deal of trouble. One metal, indeed, will very often precipitate another from an acid in its metalline form; but this is attended with the decompoſition of the ſecond metal; ſo that this can by no means be reckoned a fair experiment. But, whatever other method is uſed, the diſſolved metal is always recovered in form of an earthy powder, that we could ſcarcely imagine capable of ever becoming malleable, and aſſuming the ſplendid appearance of a metal. Now, if there was a ſtrong attraction between this and the acid, we might very juſtly conjecture, that the diſſolution happened by means of that attraction; but ſo far from this, after a metal has been diſſolved by any acid, and the calx has been ſeparated from it, it is always difficult, and very often impoſſible, to procure a diſſolution of the calx in the ſame acid. The action of the acid in this caſe ſeems not unlike that of fire upon wood or any other inflammable ſubſtance. Dry wood, thrown into the fire, burns and flames with great violence; but the ſame wood reduced to aſhes, inſtead of burning, extinguiſhes fire already kindled. In like manner, a piece of clear metal thrown into an acid, diſſolves with great violence: but the ſame metal, deprived of its phlogiſtic principle, and reduced to a calx, cannot be acted upon by acids, in whatever manner they are applied; at leaſt, not without the greateſt difficulty; and the more perfect the calx is, *i. e.* the more completely it is deprived of its inflammable principle, the greater the difficulty is of combining it afterwards with an acid.

Another thing in which the diſſolution of metals by an acid reſembles the burning of combuſtibles by fire is, that in both caſes there is a ſeparation of the principle of imflammability. In the caſe of oil of vitriol and iron filings, this is exceedingly obvious; for there the vapour which ariſes from the mixture takes fire, and explodes with great vehemence. In all other caſes it is very eaſily proved; for the calx is always capable of being revived into metal by the addition of any ſubſtance containing the phlogiſton. The calces prepared by fire, and by precipitation from acids, alſo reſemble one another ſo much, that in many caſes they are ſcarce to be diſtinguiſhed.

Theſe conſiderations ſeem to favour the hypotheſis of Dr Boerhaave; and much more does the following, namely, that almoſt all metallic ſolutions produce ſome degree of ſenſible heat. In ſome metals this is very conſiderable; but the greateſt heat producible by an aqueous ſolution of any ſubſtance is by diſſolving quicklime in the nitrous acid. The heat here greatly exceeds that of boiling water. In ſome diſſolutions of inflammable matters by a mixture of the vitriolic and nitrous acids, the heat is ſo great, that the whole mixture takes fire almoſt inſtantaneouſly. Hence the Boerhaavians think they have ſufficient grounds to conclude, that fire alone is the agent by which all diſſolutions are performed.

Theſe appearances have alſo been explained on the hypotheſis of attraction; and it has been ſaid, that the heat, &c. was owing to nothing but the violent action of the particles of the acid and metal upon each other. But the late diſcoveries made by Dr Black, with regard to heat, ſhow, that it is capable of remaining concealed in ſubſtances for any length of time, and afterwards breaking out in its proper form. It is probable therefore, that the heat produced in theſe diſſolutions is no other than what exiſted before, either in the acid, or in the metal. But for a full diſcuſſion of this ſubject ſee the articles COLD, CONGELATION, EVAPORATION, FIRE, HEAT, &c.

DISSONANCE, in muſic. See DISCORD.

DISSYLLABLE, among grammarians, a word conſiſting only of two ſyllables: ſuch are nature, ſcience, &c.

DISTAFF, an inſtrument about which flax is tied in order to be ſpun.

DISTANCE, in general, an internal between two things, either with regard to time or place *.

Acceſſible DISTANCES, in geometry, are ſuch as may be meaſured by the chain, &c. See GEOMETRY.

Inacceſſible DISTANCES, are ſuch as cannot be meaſured by the chain, &c. by reaſon of ſome river, or the like, &c. which obſtructs our paſſing from one object to another. See GEOMETRY.

DISTANCE, in aſtronomy. The diſtance of the ſun, planets, and comets, is found only from their parallax, as it cannot be found either by eclipſes or their different phaſes: for from the theory of the motions of the earth and planets we know, at any time, the proportion of the diſtances of the ſun and planets from us; and the horizontal parallaxes are in a reciprocal proportion to theſe diſtances. See ASTRONOMY, n° 182.

DISTASTE properly ſignifies an averſion or diſlike to certain foods; and may be either conſtitutional, or owing to ſome diſorder of the ſtomach.

DISTEMPER, among phyſicians, the ſame with DISEASE.

DISTEMPER, in painting, a term uſed for the working up of colours with ſomething beſides water or oil. If the colours are prepared with water, that kind of painting is called *limning;* and if with oil, it is called *painting in oil,* and ſimply *painting.* If the colours are mixed with ſize, whites of eggs, or any ſuch proper glutinous or unctuous matter, and not with oil, then they ſay it is done in *diſtemper.*

DISTENSION, in general, ſignifies the ſtretching or extending a thing to its full length or breadth.

DISTICH, a couplet of verſes making a complete ſenſe. Thus hexameter and pentameter verſes are diſpoſed in diſtichs. There are excellent morals in Cato's diſtichs.

DISTICHIASIS, in ſurgery, a diſeaſe of the eyelids, when under the ordinary eye-laſhes there grows another extraordinary row of hair, which frequently eradicates the former, and, pricking the membrane of the eye, excites pain, and brings on a defluxion.—It is cured by pulling out the ſecond row of hairs with nippers, and cauterizing the pores out of which they iſſued.

DISTILLATION. See CHEMISTRY, n° 75, *et ſeq.*

1 Difference between diſtillers and rectifiers.

The objects of diſtillation, conſidered as a trade diſtinct from the other branches of chemiſtry, are chiefly ſpirituous liquors, and thoſe waters impregnated with the eſſential oils of plants, commonly called *ſimple diſtilled* waters. The diſtilling compound ſpirits and waters is reckoned a different branch of buſineſs, and they who deal in that way are commonly called *rectifiers.* This difference, however, though it exiſts among commercial people, is not at all founded in the nature of the thing; compound ſpirits being made, and ſimple ſpirits being rectified, by the very ſame operations by which they are at firſt diſtilled, or at leaſt with very trifling alterations.

2 Spirit perfectly flavourleſs, how obtained.

The great object with every diſtiller ought to be, to procure a ſpirit perfectly flavourleſs, or at leaſt as well freed from any particular flavour as may be; and in this country the procuring of ſuch a ſpirit is no eaſy matter. The only materials for diſtillation that have been uſed in large quantity, are malt and molaſſes or treacle. Both of theſe, eſpecially the firſt, abound with an oily matter, which, riſing along with the ſpirit, communicates a diſagreeable flavour to it, and from which it can ſcarce be freed afterwards by any means whatever.—Some experiments have been made upon carrots, as a ſubject for the diſtillers: but theſe are not as yet ſufficiently deciſive; nor is it probable, that a ſpirit drawn from carrots would be at all devoid of flavour, more than one drawn from malt.—To diſſipate the eſſential oil which gives the diſagreeable flavour to malt ſpirits, it has been propoſed to inſpiſſate the wort into a rob, or thin extract like a ſyrup; afterwards to thin it with water, and ferment it in the uſual manner. This certainly promiſes great ſucceſs; there is no ſubject we know of that is poſſeſſed of any kind of eſſential oil, but what will part with it by diſtillation, or by long boiling. The inſpiſſating of the wort, however, does not ſeem to be either neceſſary, or ſafe to be attempted; for, in this caſe, there is great danger of its contracting an empyreuma, which never could be remedied. The quantity loſt by evaporation, therefore, might be occaſionally added, with an equal certainty of diſſipating the obnoxious oil. Whether the yield of ſpirit would be as great in this caſe as in the other, is a queſtion that can by no means be diſcuſſed without further experiments.

3 Eſſential oil by ſome thought convertible into ſpirit.

According to a theory adopted by ſome diſtillers, namely, that eſſential oils are convertible into ardent ſpirits; and that the more oily any ſubject is, the greater quantity of ſpirit is obtainable from it; the practice of diſſipating the oil before fermentation muſt certainly be a loſs. But we are too little acquainted with the compoſition of vinous ſpirits, to have any juſt foundation for adopting ſuch theories. Beſides, it is certain, that the quantity of ardent ſpirit producible from any ſubſtance, malt for inſtance, very greatly exceeds the quantity of eſſential oil which can by any means be obtained from the ſame; nor do we find that thoſe ſubſtances, which abound moſt in eſſential oil, yield the greateſt quantity of ſpirits. So far from this, fine ſugar, which contains little or no eſſential oil, yields a great deal of ardent ſpirit.

4 Directions concerning fermentation.

Previous to the operation of diſtilling, thoſe of brewing and fermentation are neceſſary; but as theſe are fully treated of under the article BREWING, we ſhall here only obſerve, that unleſs the boiling of the wort, before fermentation, is found to diſſipate the eſſential oil, ſo as to take away the flavour of the malt, there is no neceſſity for being at the trouble of that operation. The wort may be immediately cooled and fermented. —The fermentation ought always to be carried on as ſlowly as poſſible, and performed in veſſels cloſely ſtopped; only having at the bung a valve preſſed down by a ſpring, which will yield with leſs force than is ſufficient to burſt the veſſel. It ſhould even be ſuffered to remain till it has become perfectly fine and tranſparent; as by this means the ſpirit will not only be ſuperior in quantity, but alſo in fragrance, pungency, and vinoſity, to that commonly produced.

5 For diſtillation.

With regard to performing the operation of diſtilling, there is only one general rule that can be given; namely, to let the heat, in all caſes, be as gentle as poſſible. Accidents will be effectually prevented by having the worm of a proper wideneſs, and by rectifying the ſpirits in a water-bath; which, if ſufficiently large, will perform the operation with all the diſpatch requiſite for the moſt extenſive buſineſs.—The veſſel in which the rectification is performed, ought to be covered with water up to the neck, and to be loaded with lead at the bottom, ſo that it may ſink in the water. Thus the operation will go on as quickly as if it was on an open fire, and without the leaſt danger of a miſcarriage; nor will it ever be neceſſary to make the water in the bath come to a boiling heat.

6 For rectification.

As the end of rectification is to make the ſpirit *clean* as well as *ſtrong*, or to deprive it of the eſſential oil as well as the aqueous part, it will be proper to have regard to this even in the firſt diſtillation. For this purpoſe, the ſpirit, as it firſt comes over, ſhould be received into a quantity of cold water; as by this means the connection betwixt it and the oily matter will be conſiderably leſſened. For the ſame reaſon, after it has been once rectified in the water-bath, it ſhould be again mixed with an equal quantity of water, and diſtilled a ſecond time. Thus the ſpirit will be freed from moſt of the oily matter, even though it hath been very much impregnated with it at firſt. It is neceſſary to obſerve, however, that by uſing ſuch a quantity of water, a conſiderable part of the ſpirit will be left in the reſiduum of each rectification. All theſe reſiduums, therefore, muſt be mixed together, and diſtilled on an open fire, with a briſk heat, that the remainder of the ſpirit may be got out.

After the ſpirit has been diſtilled once or twice in this manner from water, it may be diſtilled in a water-bath without any addition; and this laſt rectification will free it from moſt of the water it contains. But if it is required to be highly dephlegmated, a quantity of pure and dry ſalt of tartar muſt be added. The attraction betwixt this ſalt and water is greater than that betwixt water and ſpirit of wine. The ſalt therefore imbibes the water contained in the ſpirit, and ſinks with it to the bottom. The ſpirit, by a ſingle diſtillation, may then be rendered perfectly free from water; but there is great danger of ſome of the alkaline ſalt riſing along with it, and impregnating it with what is called an *urinous* flavour. When this once happens, it is impoſſible to be remedied; and the only way to prevent it, is to make the heat with which the ſpirit is diſtilled as gentle as poſſible.—It hath been propoſed, indeed, to prevent the riſing of any thing alkaline, by the admixture of ſome calcined vitriol, ſal catharticus amarus, or other imperfect neutral ſalt; but this can ſcarce be ſuppoſed to anſwer any good purpoſe, as the alkali unites itſelf with the oily matter of the ſpirit, and forms a kind of ſaponaceous compound, which is not ſo eaſily affected by the acid of the vitriol or other ſalt, eſpecially as theſe ſalts will not diſſolve in the ſpirit itſelf.

7 Of imit ting for ſpirits.

One very great deſideratum among the diſtillers of this country, is a method of imitating the foreign ſpirits, brandy, rum, gin, &c. to a tolerable degree of perfection; and notwithſtanding the many attempts that are daily made for this purpoſe, the ſucceſs in general hath been but very indifferent. On this ſubject, Mr Cooper hath the following obſervations, in his "Complete Syſtem of Diſtillation;" which, as they are applicable to all other ſpirits as well as brandy, we ſhall here tranſcribe.—

8 Metho making brandie France.

"The general method of diſtilling brandies in France need not be formally deſcribed, as it differs in nothing from that practiſed here in working from malt-waſh, or molaſſes; nor are they in the leaſt more cleanly or exact in the operation. They only obſerve more particularly to throw in a little of the natural ley into the ſtill along with the wine, as finding this gives their ſpirit the flavour for which it is generally admired abroad.—But, though brandy is extracted from wine, experience tells us that there is a great difference in the grapes from which the wine is made. Every ſoil, every climate, every kind of grapes, varies with regard to the quantity and quality of the ſpirits extracted from them. There are ſome grapes which are only fit for eating; others for drying, as thoſe of Damaſcus, Corinth, Provence, and Avignon, but not fit to make wine.—Some wines are very proper for diſtillation, and others much leſs ſo. The wines of Languedoc and Provence afford a great deal of brandy by diſtillation, when the operation is performed on them in their full ſtrength. The Orleans wines, and thoſe of Blois, afford yet more: but the beſt are thoſe of the territories of Cogniac and Andaye; which are, however, in the number of thoſe the leaſt drunk in France. Whereas thoſe of Burgundy and Champagne, though of a very fine flavour, are improper, becauſe they yield but very little in diſtillation.

"It muſt alſo be farther obſerved, that all the wines for diſtillation, as thoſe of Spain, the Canaries, of Alicant, of Cyprus, of St Peres, of Toquet, of Grave, of Hungary, and others of the ſame kind, yield very little brandy by diſtillation; and conſequently would coſt the diſtiller conſiderably more than he could ſell it for. What is drawn from them is indeed very good, always retaining the ſaccharine quality and rich flavour of the wine from whence it is drawn; but as it grows old, this flavour often becomes aromatic, and is not agreeable to all palates.

"Hence we ſee that brandies always differ according as they are extracted from different ſpecies of grapes. Nor would there be ſo great a ſimilarity as there is between the different kinds of French brandies, were the ſtrongeſt wines uſed for this purpoſe: but this is rarely the caſe; the weakeſt and loweſt flavoured wines only are diſtilled for their ſpirit, or ſuch as prove abſolutely unfit for any other uſe.

"A large quantity of brandy is diſtilled in France during the time of the vintage; for all thoſe poor grapes that prove unfit for wine, are uſually firſt gathered, preſſed, their juice fermented, and directly diſtilled. This rids their hands of their poor wines at once, and leaves their caſks empty for the reception of better. It is a general rule with them not to diſtil wine that will fetch any price as wine; for, in this ſtate, the profits upon them are vaſtly greater than when reduced to brandies. This large ſtock of ſmall wines, with which they are almoſt over-run in France, ſufficiently accounts for their making ſuch vaſt quantities of brandy in that country, more than in others which lie in warmer climates and are much better adapted to the production of grapes.—Nor is this the only fund of their brandies: for all the wine that turns eager, is alſo condemned to the ſtill; and, in ſhort, all that they can neither export nor conſume at home, which amounts to a large quantity; ſince much of the wine laid in for their family proviſion is ſo poor as not to keep during the time of ſpending.

"Hence many of our Engliſh ſpirits, with proper management, are convertible into brandies that ſhall hardly be diſtinguiſhed from the foreign in many reſpects, provided the operation be neatly performed.

"The common method of rectifying ſpirits from alkaline ſalts, deſtroys their vinoſity, and in its ſtead introduces an urinous or lixivious taſte. But as it is abſolutely neceſſary to reſtore, or at leaſt to ſubſtitute in its room, ſome degree of vinoſity, ſeveral methods have been propoſed, and a multitude of experiments performed, in order to diſcover this great deſideratum. But none has ſucceeded equal to the ſpirit of nitre; and accordingly this ſpirit, either ſtrong or dulcified, has been uſed by moſt diſtillers to give an agreeable vinoſity to their ſpirits. Several difficulties, however, occur in the method of uſing it; the principal of which is, its being apt to quit the liquor in a ſhort time, and conſequently depriving the liquor of that vinoſity it was intended to give. In order to remove this difficulty, and prevent the vinoſity from quitting the goods, the dulcified ſpirit of nitre, which is much better than the ſtrong ſpirit, ſhould be prepared by a previous digeſtion, continued for ſome time, with alcohol; the longer the digeſtion is continued, the more intimately will they be blended, and the compound rendered the milder and ſofter.

"After a proper digeſtion, the dulcified ſpirit ſhould be mixed with the brandy, by which the vinoſity will be intimately blended with the goods, and not diſpoſed to fly off for a very conſiderable time.—No general rule can be given for the quantity of this mineral acid requiſite to be employed; becauſe different proportions of it are neceſſary in different ſpirits. It ſhould, however, be carefully attended to, that though a ſmall quantity of it will undoubtedly give an agreeable vinoſity reſembling that naturally found in the fine ſubtile ſpirits drawn from wines, yet an over large doſe of it will not only cauſe a diſagreeable flavour, but alſo render the whole deſign abortive, by diſcovering the impoſition. Thoſe, therefore, who endeavour to cover a foul taſte in goods by large doſes of dulcified ſpirit of nitre, will find themſelves deceived.

"But the beſt, and indeed the only method of imitating French brandies to perfection, is by an eſſential oil of wine; this being the very thing that gives the French brandies their flavour. It muſt, however, be remembered, that, in order to uſe even this ingredient to advantage, a pure, taſteleſs ſpirit muſt firſt be procured; for it is ridiculous to expect that this eſſential oil ſhould be able to give the agreeable flavour of French brandies to our fulſome malt ſpirit, already loaded with its own nauſeous oil, or ſtrongly impregnated with a lixivious taſte from the alkaline ſalts uſed in rectification. How a pure inſipid ſpirit may be obtained, has already been conſidered; it only therefore remains to ſhew the method of procuring this eſſential oil of wine, which is this:

"Take ſome cakes of dry wine-lees, ſuch as are uſed by our hatters, diſſolve them in ſix or eight times their weight of water, diſtil the liquor with a ſlow fire, and ſeparate the oil with a ſeparating glaſs; reſerving for the niceſt uſes only that which comes over firſt, the ſucceeding oil being coarſer and more reſinous.—Having procured this fine oil of wine, it may be mixed into a quinteſſence with pure alcohol; by which means it may be preſerved a long time fully poſſeſſed of all its flavour and virtues; but, without ſuch management, it will ſoon grow reſinous and rancid.

"When a fine eſſential oil of wine is thus procured, and alſo a pure and inſipid ſpirit, French brandies may be imitated to perfection, with regard to the flavour. It muſt however be remembered, and carefully adverted to, that the eſſential oil be drawn from the ſame kind of lees as the brandy to be imitated was procured from; we mean, in order to imitate Coniac brandy, it will be neceſſary to diſtil the eſſential oil from Coniac lees; and the ſame for any other kind of brandy. For, as different brandies have different flavours, and as theſe flavours are entirely owing to the eſſential oil of the grape, it would be prepoſterous to endeavour to imitate the flavour of Coniac brandy with an eſſential oil procured from the lees of Bourdeaux wine.—When the flavour of the brandy is well imitated by a proper doſe of the eſſential oil, and the whole reduced into one ſimple and homogeneous fluid, other difficulties are ſtill behind: The flavour, though the eſſential part, is not, however, the only one; the colour, the proof, and the ſoftneſs, muſt alſo be regarded, before a ſpirit that perfectly reſembles brandy can be procured. With regard to the proof, it may be eaſily hit, by uſing a ſpirit rectified above proof; which, after being intimately mixed with the eſſential oil of wine, may be let down to a proper ſtandard with fair water. And the ſoftneſs may, in a great meaſure, be obtained by diſtilling and rectifying the ſpirit with a gentle fire; and what is wanting of this criterion in the liquor when firſt made, will be ſupplied by time: for it muſt be remembered, that it is time alone that gives this property to French brandies; they being at firſt acrid, foul, and fiery. But, with regard to the colour, a particular method is required to imitate it to perfection.

10 Spirits how coloured.

"The art of colouring ſprits owes its riſe to obſervations on foreign brandies. A piece of French brandy that has acquired by age a great degree of ſoftneſs and ripeneſs, is obſerved, at the ſame time, to have acquired a yellowiſh brown colour; and hence our diſtillers have endeavoured to imitate this colour in ſuch ſpirits as are intended to paſs for French brandy. And in order to this, a great variety of experiments have been made on different ſubſtances. But in order to know a direct and ſure method of imitating this colour to perfection, it is neceſſary we ſhould be informed whence the French brandies themſelves acquire their colour. This diſcovery is very eaſily made. The common experiment of trying whether brandy will turn blackiſh with a ſolution of iron, ſhews that the colour is owing to ſome of the reſinous matter of the oak-caſk diſſolved in the ſpirit. There can be no difficulty, therefore, in imitating this colour to perfection. A ſmall quantity of the extract of oak, or the ſhavings of that wood, properly digeſted, will furniſh us with a tincture capable of giving the ſpirit any degree of colour required. But it muſt be remembered, that as the tincture is extracted from the caſk by brandy, that is, alcohol and water, it is neceſſary to uſe both in extracting the tincture; for each of theſe diſſolves different parts of the wood. Let, therefore, a ſufficient quantity of oak ſhavings be digeſted in ſtrong ſpirit of wine, and alſo at the ſame time other oak ſhavings be digeſted in water; and when the liquors have acquired a ſtrong tincture from the oak, let both be poured off from the ſhavings into different veſſels, and both placed over a gentle fire till reduced to the conſiſtence of treacle. In this condition let the two extracts be intimately mixed together; which may be effectually done by adding a ſmall quantity of loaf-ſugar, in fine powder, and rubbing the whole well together. By this means a liquid eſſential extract of oak will be procured, and always ready to be uſed as occaſion ſhall require.

"There are other methods in uſe for colouring brandies; but the beſt, beſides the extract of oak above-mentioned, are treacle and burnt ſugar. The treacle gives the ſpirits a fine colour, nearly reſembling that of French brandy; but as its colour is but dilute, a large quantity muſt be uſed: this is not, however, attended with any bad conſequences; for notwithſtanding the ſpirit is really weakened by this addition, yet the bubble proof, the general criterion of ſpirits, is greatly mended by the tenacity imparted to the liquor by the treacle. The ſpirit alſo acquires from the mixture a ſweetiſh or luſcious taſte, and a fullneſs in the mouth; both which properties render it very agreeable to the palates of the common people, who are, in fact, the principal conſumers of theſe ſpirits. A much ſmaller quantity of burnt ſugar than of treacle will be ſufficient for colouring the ſame quantity of ſpirits: the taſte is alſo very different; for inſtead of the ſweetneſs imparted by the treacle, the ſpirit acquires from the burnt ſugar an agreeable bitterneſs, and by that means recommends itſelf to nicer palates, which are offended with a luſcious ſpirit. The burnt ſugar is prepared by diſſolving a proper quantity of ſugar in a little water, and ſcorching it over the fire till it acquires a black colour. Either treacle or burnt ſugar will nearly imitate the genuine colour of old French brandy; but neither of them will ſucceed when put to the teſt of the vitriolic ſolution.

"The ſpirit diſtilled from molaſſes or treacle is very clean or pure. It is made from common treacle diſſolved in water, and fermented in the ſame manner as the waſh for the common malt ſpirit. But if ſome particular art is not uſed in diſtilling this ſpirit, it will not prove ſo vinous as malt ſpirit, but more flat and leſs pungent and acid, though otherwiſe much cleaner taſted, as its eſſential oil is of a much leſs offenſive flavour. Therefore, if good freſh wine lees, abounding in tartar, be added and duly fermented with the molaſſes, the ſpirit will acquire a much greater vinoſity and briſkneſs, and approach much nearer to the nature of foreign ſpirits. Where the molaſſes ſpirit is brought to the common proof-ſtrength, if it is found not to have a ſufficient vinoſity, it will be very proper to add ſome good dulcified ſpirit of nitre; and if the ſpirit be clean worked, it may, by this addition only, be made to paſs on ordinary judges for French brandy. Great quantities of this ſpirit are uſed in adulterating foreign brandy, rum, and arrack. Much of it is alſo uſed alone in making cherry-brandy, and other drams by infuſion; in all which many, and perhaps with juſtice, prefer it to foreign brandies. Molaſſes, like all other ſpirits, is entirely colourleſs when firſt extracted; but diſtillers always give it as nearly as poſſible the colour of foreign ſpirits."

11 Rum ho imitated.

If theſe principles hold good, the imitation of foreign ſpirits of all kinds muſt be an eaſy matter. It will only coſt the procuring of ſome of thoſe ſubſtances from which the ſpirit is drawn; and diſtilling this with water, the eſſential oil will always give the flavour deſired. Thus, to imitate Jamaica rum, it will only be neceſſary to procure ſome of the tops, or other uſeleſs parts, of the ſugar-canes; from which an eſſential oil being drawn, and mixed with clean molaſſes ſpirit, will give it the true flavour. The principal difficulty muſt lie in procuring a ſpirit totally, or nearly, free of all flavour of its own. The ſpirit drawn from the refuſe of a ſugar-houſe is by our author commended as ſuperior to that drawn from molaſſes: though even this is not entirely devoid of ſome kind of flavour of its own; nor indeed is that drawn from the beſt refined ſugar entirely flavourleſs. It is very probable, therefore, that to procure an abſolutely flavourleſs ſpirit is impoſſible, The only method, therefore, of imitating foreign ſpirits. is by chooſing ſuch materials as will yield a ſpirit flavoured as much like them as poſſible. The materials moſt recommended by our author in this caſe, and probably the beſt that can be uſed, are raiſins. Concerning theſe he gives the following directions. "In order to extract this ſpirit, the raiſins muſt be infuſed in a proper quantity of water, and fermented in the manner already directed. When the fermentation is completed, the whole is to be thrown into the ſtill, and the ſpirit extracted by a ſtrong fire. The reaſon why we here direct a ſtrong fire is, becauſe by that means a greater quantity of the eſſential oil will come over the helm with the ſpirit, which will render it fitter for the diſtiller's purpoſe: for this ſpirit is commonly uſed to mix with common malt goods; and it is ſurpriſing how far it will go in this reſpect, ten gallons of it being often ſufficient to give a determining flavour and agreeable vinoſity to a whole piece of malt ſpirits. It is

12 Raiſins beſt ma rial for curing pure ſp

is therefore well worth the diſtiller's while to endeavour at improving the common method of extracting ſpirits from raiſins; and perhaps the following hint may merit attention. When the fermentation is completed, and the ſtill charged with fermented liquor as above directed, let the whole be drawn off with as briſk a fire as poſſible; but, inſtead of the caſk or can generally uſed by diſtillers for a receiver, let a large glaſs, called by chemiſts a *ſeparating glaſs*, be placed under the noſe of the worm, and a common receiver applied to the ſpout of the ſeparating glaſs: by this means the eſſential oil will ſwim upon the top of the ſpirit, or rather low-wine, in the ſeparating glaſs, and may be eaſily preſerved at the end of the operation. The uſe of this limpid eſſential oil is well known to diſtillers; for in this reſides the whole flavour, and conſequently may be uſed to the greateſt advantage in giving that diſtinguiſhing taſte and true vinoſity to the common malt ſpirits. After the oil is ſeparated from the low-wine, the liquor may be rectified in balneo mariæ into a pure and almoſt taſteleſs ſpirit, and therefore well adapted to make the fineſt compound cordials, or to imitate or mix with the fineſt French brandies, arracks, &c. In the ſame manner a ſpirit may be obtained from cyder. But as its particular flavour is not ſo deſirable as that obtained from raiſins, it ſhould be diſtilled in a more gentle manner, and carefully rectified according to the directions we have already given."

13 rections diſtilling pound rits.

Theſe directions may ſuffice for the diſtillation of any kind of ſimple ſpirits. The diſtillation of compound ones depends on the obſervation of the following general rules, which are very eaſy to be learned and practiſed.

1. The artiſt muſt always be careful to uſe a well cleanſed ſpirit, or one freed from its own eſſential oil. For, as a compound water is nothing more than a ſpirit impregnated with the eſſential oil of the ingredients, it is neceſſary that the ſpirit ſhould have depoſited its own.

2. Let the time of previous digeſtion be proportioned to the tenacity of the ingredients, or the ponderoſity of their oil.

3. Let the ſtrength of the fire alſo be proportioned to the ponderoſity of the oil intended to be raiſed with the ſpirit.

4. Let only a due proportion of the fineſt parts of the eſſential oil be united with the ſpirit; the groſſer and leſs fragrant parts of the oil not giving the ſpirit ſo agreeable a flavour, and at the ſame time rendering it unſightly. This may in a great meaſure be effected by leaving out the faints, and making up to proof with fine ſoft water in their ſtead.

A careful obſervation of theſe four rules will render this part of diſtillation much more perfect than it is at preſent. Nor will there be any occaſion for the uſe of burnt alum, white of eggs, iſinglaſs, &c. to fine down cordial waters; for they will preſently be fine, ſweet and pleaſant taſted, without any further trouble. We ſhall now ſubjoin particular receipts for making ſome of thoſe compound waters, or ſpirits, that are moſt commonly to be met with, and are in the moſt general eſtimation.

14 ipts for nber of pound s.

Strong Cinnamon-water. Take eight pounds of fine cinnamon bruiſed, 17 gallons of clean rectified ſpirit, and two gallons of water. Put them into your ſtill, and digeſt them 24 hours with a gentle heat; after which draw off 16 gallons with a pretty ſtrong heat.—A cheaper ſpirit, but of an inferior quality, may be obtained, by uſing caſſia lignea inſtead of cinnamon. If you would dulcify your cinnamon water, take double-refined ſugar in what quantity you pleaſe; the general proportion is about two pounds to a gallon; and diſſolve it in the ſpirit, after you have made it up proof with clean water. One general caution is here neceſſary to be added; namely, that near the end of the operation, you carefully watch the ſpirit as it runs into the receiver, in order to prevent the faints from mixing with the goods. This you may diſcover by often catching ſome of it as it runs from the worm in a glaſs, and obſerving whether it is fine and tranſparent; for as ſoon as ever the faints begin to riſe, the ſpirit will have an azure or bluiſh caſt. As ſoon as this alteration in colour is perceived, the receiver muſt be immediately changed; for if the faints are ſuffered to mix themſelves with the reſt, the value of the goods will be greatly leſſened.—Here we may obſerve, that the diſtillers call ſuch goods as are made up proof, *double goods*; and thoſe below proof, *ſingle*.

Clove-water. Take of cloves bruiſed, four pounds; pimento, or all-ſpice, half a pound; proof ſpirit, 16 gallons. Digeſt the mixture 12 hours in a gentle heat, and then draw off 15 gallons with a pretty briſk fire. The water may be coloured red, either by a ſtrong tincture of cochineal, alkanet, or corn-poppy flowers. It may be dulcified at pleaſure with double-refined ſugar.

Lemon-water. Take of dried lemon-peel, four pounds; clean proof ſpirit 10 gallons and a half, and one gallon of water. Draw off 10 gallons by a gentle fire, and dulcify with fine ſugar.

Citron-water. Take of dry yellow rhinds of citrons, three pounds; of orange-peel, two pounds; nutmegs bruiſed, three quarters of a pound; clean proof-ſpirit, ten gallons and a half; water, one gallon: digeſt with a gentle heat; then draw off ten gallons in balneo mariæ, and dulcify with fine ſugar.

Aniſeed-water. Take of aniſeed bruiſed, two pounds; proof-ſpirit, 12 gallons and a half; water, one gallon: draw off ten gallons with a moderate fire.—This water ſhould never be reduced below proof; becauſe the large quantity of oil with which it is impregnated, will render the goods milky and foul when brought down below proof. But if there is a neceſſity for doing this, their tranſparency may be reſtored by filtration.

Orange-water. Take of the yellow part of freſh orange-peels, five pounds; clean proof-ſpirit, ten gallons and a half; water, two gallons: draw off ten gallons with a gentle fire.

Cedrat-water. The cedrat is a ſpecies of citron, and very highly eſteemed in Italy where it grows naturally. The fruit is difficult to be procured in this country; but as the eſſential oil is often imported from Italy, it may be made with it according to the following receipt.—Take of the fineſt loaf-ſugar reduced to powder, a quarter of a pound; put it into a glaſs mortar, with 120 drops of the eſſence of cedrat; rub them together with a glaſs peſtle; and put them into a glaſs alembic, with a gallon of fine proof-ſpirits and a quart of water. Place the alembic in balneo mariæ, and

Diſtillation.

and draw off one gallon, or till the faints begin to riſe; and dulcify with fine ſugar. This is reckoned the fineſt cordial yet known; it will therefore be neceſſary to be particularly careful that the ſpirit is perfectly clean, and, as much as poſſible, freed from any flavour of its own.

Orange Cordial-water, or *Eau de Bigarade*. Take the outer or yellow part of the peels of 14 bigarades, (a kind of oranges); half an ounce of nutmegs, a quarter of an ounce of mace, a gallon of fine proof-ſpirit, and two quarts of water. Digeſt all theſe together two days in a cloſe veſſel; after which draw off a gallon with a gentle fire, and dulcify with fine ſugar. This cordial is greatly eſteemed abroad, but is not ſo well known in this country.

Ros Solis. Take of the herb called *Ros Solis*, picked clean, four pounds; cinnamon, cloves, and nutmegs, of each three ounces and a half; marigold-flowers, one pound; caraway-ſeeds, ten ounces; proof-ſpirit, ten gallons; water, three gallons. Diſtill with a pretty ſtrong fire, till the faints begin to riſe. Then take of liquorice-root ſliced, half a pound; raiſins ſtoned, two pounds; red ſaunders, half a pound: digeſt theſe three days in two quarts of water; then ſtrain out the clear liquor, in which diſſolve three pounds of fine ſugar, and mix it with the ſpirit drawn by diſtillation.

Uſquebaugh. Take of nutmegs, cloves, and cinnamon, of each two ounces; of the ſeeds of aniſe, caraway, and coriander, of each four ounces; liquorice-root ſliced, half a pound. Bruiſe the ſeeds and ſpices; and put them, together with the liquorice, into the ſtill with 11 gallons of proof-ſpirits, and two gallons of water. Diſtil with a pretty briſk fire till the faints begin to riſe. But, as ſoon as the ſtill begins to work, faſten to the noſe of the worm two ounces of Engliſh ſaffron tied up in a cloth, that the liquor may run thro' it, and extract all its tincture; and in order to this, you ſhould frequently preſs the ſaffron with your fingers. When the operation is finiſhed, dulcify your goods with fine ſugar.

Ratafia. Is a liquor prepared from different kinds of fruits, and is of different colours according to the fruits made uſe of. Of red ratafia there are three kinds, the fine, the dry or ſharp, and the common. The fruits moſt proper for making red ratafia, are the black heart-cherry, the common red cherry, the black cherry, the mery or honey cherry, the ſtrawberry, the raſberry, the red gooſeberry, and the mulberry. Theſe fruits ſhould be gathered when in their greateſt perfection, and the largeſt and moſt beautiful of them choſen for the purpoſe.—The following is a receipt for making red ratafia, fine and ſoft. Take of the black heart-cherries 24 pounds; black cherries, four pounds; raſberries and ſtrawberries, of each three pounds. Pick the fruits from their ſtalks, and bruiſe them; in which ſtate let them continue 12 hours: preſs out the juice; and to every pint of it add a quarter of a pound of ſugar. When the ſugar is diſſolved, run the whole through the filtrating bag, and add to it three quarts of clean proof-ſpirits. Then take of cinnamon, four ounces; of mace, an ounce; and of cloves, two drams. Bruiſe theſe ſpices; put them into an alembic with a gallon of clean proof-ſpirits and two quarts of water, and draw off a gallon with a briſk fire. Add as much of this ſpicy ſpirit to your ratafia as will render it agreeable to your palate; about one fourth is the uſual proportion.

Ratafia made according to the above receipt will be of a very rich flavour and elegant colour. It may be rendered more or leſs of a ſpicy flavour, by adding or diminiſhing the quantity of ſpirit diſtilled from the ſpices.—Some, in making ratafia, ſuffer the expreſſed juices of their fruits to ferment ſeveral days: by this means the vinoſity of the ratafia is increaſed; but, at the ſame time, the elegant flavour of the fruits is greatly diminiſhed. Therefore, if the ratafia is deſired ſtronger or more vinous, it may be done by adding more ſpirits to the expreſſed juice; by which means the flavour of the fruits may be preſerved, as well as the ratafia rendered ſtronger. It is alſo a method with ſome to tie the ſpices in a linen bag, and ſuſpend them in the ratafia. But if this method is taken, it will be neceſſary to augment the quantity of ſpirit firſt added to the expreſſed juice. There is no great difference in the two methods of adding the ſpices, except that by ſuſpending them in the ratafia the liquor is rendered leſs tranſparent.

Dry or ſharp Ratafia. Take cherries and gooſeberries, of each 30 pounds; mulberries, ſeven pounds; raſberries, ten pounds. Pick all theſe fruits clean from their ſtalks, &c. bruiſe them, and let them ſtand 12 hours; but do not ſuffer them to ferment. Preſs out the juice, and to every pint add three ounces of ſugar. When the ſugar is diſſolved, run it through the filtrating bag, and to every five pints of liquor, add four pints of clean proof-ſpirit; together with the ſame proportion of ſpirit drawn from the ſpices in the foregoing compoſition.

Common Ratafia. Take of nutmegs, eight ounces; bitter almonds, ten pounds; Liſbon ſugar, eight pounds; ambergreaſe, ten grains: infuſe theſe ingredients three days in ten gallons of clean proof-ſpirit, and filter thro' a flanel bag for uſe. The nutmegs and bitter almonds muſt be bruiſed, and the ambergreaſe rubbed with the Liſbon ſugar in a marble mortar, before they are infuſed in the ſpirit.

Gold Cordial. Take of the roots of angelica, four pounds; raiſins ſtoned, two pounds; coriander-ſeeds, half a pound; caraway-ſeeds and cinnamon, of each half a pound; cloves, two ounces; figs and liquorice-root, of each one pound; proof ſpirit, eleven gallons; water, two gallons. The angelica, liquorice, and figs, muſt be ſliced before they are added. Digeſt two days; and draw off by a gentle heat till the faints begin to riſe; hanging in a piece of linen, faſtened to the mouth of the worm, an ounce of Engliſh ſaffron. Then diſſolve eight pounds of ſugar in three quarts of roſe-water, and add to it the diſtilled liquor.—This liquor derives its name of *Gold Cordial*, from a quantity of leaf-gold being formerly added to it; but this is now generally diſuſed, as it cannot poſſibly add any virtue.

Cardamum, or *All-fours*. Take of pimento, caraway, and coriander ſeeds, and lemon-peel, each three pounds; of malt ſpirits, eleven gallons; water, three gallons. Draw off with a gentle fire, dulcify with common ſugar, and make up to the ſtrength deſired with clear water.—This is a dram greatly uſed by the poorer ſort of people in ſome counties.

Geneva. There was formerly ſold in the apothecaries ſhops a diſtilled ſpirituous water of juniper; but the vulgar being fond of it as a dram, the diſtillers ſupplanted the apothecaries, and ſold it under the name of *Geneva*. The common kind, however, is not made from juniper-berries, but from oil of turpentine; and indeed it is ſurpriſing, that people ſhould accuſtom themſelves to drink ſuch liquors for pleaſure.—The receipt for making this kind of ſpirit, ſold in the gin-ſhops at London, is as follows. Take of the ordinary malt ſpirits, ten gallons; oil of turpentine, two ounces; bay-ſalt, three handfuls: Draw off by a gentle fire till the faints begin to riſe; and make up your goods to the ſtrength required with clear water.

The beſt kind is made by the following recipe.—Take of juniper-berries, three pounds; proof-ſpirit, ten gallons; water, four gallons: Draw off by a gentle fire till the faints begin to riſe, and make up your goods to the ſtrength required with clean water.

There is a ſort of this liquor called *Hollands Geneva*, from its being imported from Holland, which is greatly eſteemed.—The ingredients uſed by the Dutch, are the ſame with thoſe given in the laſt recipe; only, inſtead of malt-ſpirits, they uſe French brandy. But from what has been already obſerved concerning the nature of theſe kinds of ſpirits, it is eaſy to ſee, that by the help of a well rectified ſpirit, geneva may be made in in this country at leaſt nearly equal to the Dutch, provided it is kept to a proper age; for all ſpirituous liquors contract a ſoftneſs and mellowneſs by age, impoſſible to be imitated any other way.

DISTINCT SMALL-POX. See (the Index ſubjoined to) MEDICINE.

DISTINCTION, in logic, is an aſſemblage of two or more words, whereby diſparate things, or their conceptions, are denoted.

DISTORTION, in medicine, is when any part of the human body remarkably deviates from its natural ſhape or poſition. Diſtortions of different parts may ariſe either from a convulſion or palſy; though ſometimes a terrible diſtortion in the ſhape of the whole body hath ariſen merely from careleſsneſs and ill habits. Mr Winſlow, in the Memoirs of the Academy of Sciences at Paris, gives a very remarkable account of a lady of quality, whom he had known to be perfectly ſtraight for ſeveral years; but who taking afterwards to a ſedentary courſe of life, got a cuſtom of dreſſing herſelf very careleſsly, and of leaning as ſhe ſat, either forwards, or to a ſide. It was not many months before ſhe found it painful and troubleſome to ſtand or ſit upright; and ſoon afterwards ſhe found an inequality in the lower part of the back-bone. Alarmed at this, ſhe conſulted the gentleman who gave the account. To prevent the increaſe of the malady, he ordered her to wear a particular ſort of jumps inſtead of ſtays, and had a pad of a proper ſize applied: but this was ſoon neglected; and the conſequence was, that in a little time the back-bone became more and more crooked, and at length bent itſelf ſidewiſe in two contrary directions, ſo as to repreſent the figure of the Roman S; and the lady, ſtill refuſing to take the proper meaſures, loſt a fourth part of her height; and continued for the remainder of her life, not only crooked from right to left, and from left to right, but ſo oddly folded together, that the firſt of the falſe ribs on one ſide, approached very near the creſt of the os ilium on that ſide, and the viſcera of the lower belly became ſtrangely puſhed out of their regular places to the oppoſite ſide; and the ſtomach itſelf was ſo ſtrongly compreſſed, that whatever ſhe ſwallowed ſeemed to her to fall into two ſeparate cavities.

DISTRESS, in law, the ſeizing or diſtraining any thing for rent in arrear, or other duty unperformed.

The effect of this diſtreſs is to compel the party either to replevy the things diſtrained, and conteſt the taking, in an action of treſpaſs againſt the diſtrainer; or rather to oblige him to compound and pay the debt or duty for which he was ſo diſtrained.

There are likewiſe compulſory diſtreſſes in actions, to cauſe a perſon appear in court; of which kind there is a diſtreſs perſonal of one's moveable goods, and the profits of his lands, for contempt in not appearing after ſummons: there is likewiſe diſtreſs real, of a perſon's immoveable goods. In theſe caſes none ſhall be diſtrained to anſwer for any thing touching their freeholds, but by the king's writ.

Diſtreſs may be either finite or infinite. Finite diſtreſs is that which is limited by law, in regard to the number of times it ſhall be made, in order to bring the party to a trial of the action. Infinite diſtreſs is that which is without any limitation, being made till the perſon appears: it is farther applied to jurors that do not appear; as, upon a certificate of aſſiſe, the proceſs is *venire facias*, *habeas corpora*, and diſtreſs infinite.

It is alſo divided into grand diſtreſs, and ordinary diſtreſs: of theſe the former extends to all the goods and chattels that the party has within the county. A perſon, of common right, may diſtrain for rents and all manner of ſervices; and where a rent is reſerved on a gift in tail, leaſe for life, or years, &c. though there be no clauſe of diſtreſs in the grant or leaſe, ſo as that he has the reverſion: but on a feoffment made in fee, a diſtreſs may not be taken, unleſs it be expreſsly reſerved in the deed.

DISTRIBUTION, in a general ſenſe, the act of dividing a thing into ſeveral parts, in order to the diſpoſing each in its proper place.

DISTRIBUTION, in architecture, the dividing and diſpoſing the ſeveral parts and pieces which compoſe a building, as the plan directs. See ARCHITECTURE.

DISTRIBUTION, in rhetoric, a kind of deſcription, whereby an orderly diviſion and enumeration is made of the principal qualities of the ſubject. David ſupplies us with an example of this kind, when, in the heat of his indignation againſt ſinners, he gives a deſcription of their iniquity: "Their throat is an open ſepulchre; they flatter with their tongues; the poiſon of aſps is under their lips; their mouth is full of curſing and lies; and their feet are ſwift to ſhed blood."

DISTRIBUTION, in printing, the taking a form aſunder, ſeparating the letters, and diſpoſing them in the caſes again, each in its proper cell. See PRINTING.

DISTRICT, in geography, a part of a province, diſtinguiſhed by peculiar magiſtrates, or certain privileges; in which ſenſe it is ſynonymous with hundred. See HUNDRED.

DISTRINGAS, in law, a writ commanding the ſheriff, or other officer, that he diſtrain a perſon for debt to the king, &c. or for his appearance at a certain day.

DISTRINGAS *Juratores*, a writ directed to the ſheriff, whereby he is commanded to diſtrain upon a jury to appear, and to return iſſues on their lands, &c. for non-appearance. This writ of diſtringas juratores iſſues for the ſheriff to have their bodies in court, &c. at the return of the writ.

DITCH, a common fence or incloſure in marſhes, or other wet land where there are no hedges. They allow theſe ditches ſix feet wide againſt highways that are broad; and againſt commons, five feet. But the common ditches about incloſures, dug at the bottom of the bank on which the quick is raiſed, are three feet wide at the top, one at the bottom, and two feet deep. By this means each ſide has a ſlope, which is of great advantage; for where this is neglected, and the ditches dug perpendicular, the ſides are always waſhing down. Beſides, in a narrow-bottomed ditch, if cattle get down into it, they cannot ſtand to turn themſelves to crop the quick: but where the ditch is four feet wide, it ſhould be two and a half deep; and where it is five wide, it ſhould be three deep, and ſo in proportion.

Ditch-*Water* is often uſed as an object for the microſcope, and ſeldom fails to afford a great variety of animalcules. This water very often appears of a yellowiſh, greeniſh, or reddiſh colour; and this is wholly owing to the multitudes of animals of thoſe colours which inhabit it. Theſe animals are uſually of the ſhrimp kind: and Swammerdam, who very accurately examined them, has called them, from the figure of their horns, *pulex aquaticus arboreſcens*. They copulate in May or June; and are often ſo numerous at that ſeaſon, that the whole body of the water they are found in, is ſeen to be of a red, green, or yellowiſh colour, according to the colours of their bodies. The green thin ſcum alſo, ſo frequently ſeen on the ſurface of ſtanding waters in ſummer, is no other than a multitude of ſmall animalcules of this or ſome of the other kinds. Dunghill water is not leſs full of animals than that of ditches; and is often found ſo thronged with animalcules, that it ſeems altogether alive: it is then ſo very much crowded with theſe creatures, that it muſt be diluted with clear water before they can be diſtinctly viewed. There are uſually in this fluid a ſort of eels, which are extremely active; and beſides theſe and many other of the common inhabitants of fluids, there is one ſpecies found in this, which ſeems peculiar to it: the middle part of them is dark, and beſet with hairs, but the ends are tranſparent; their tails are tapering, with a long ſprig at the extremity, and their motion is ſlow and waddling. See Animalcule.

DITHYRAMBUS, in ancient poetry, a hymn in honour of Bacchus, full of tranſport and poetical rage.

This poetry owes it birth to Greece, and to the tranſports of wine; and yet art is not quite exploded, but delicately applied to guide and reſtrain the dithyrambic impetuoſity, which is indulged only in pleaſing flights. Horace and Ariſtotle tell us, that the ancients gave the name of dithyrambus to thoſe verſes wherein none of the common rules or meaſures were obſerved. As we have now no remains of the dithyrambus of the ancients, we cannot ſay exactly what their meaſure was.

DITONE, in muſic, an interval comprehending two tones. The proportion of the ſounds that form the ditone is 4 : 5, and that of the ſemiditone is 5 : 6.

DITRIHEDRIA, in mineralogy, a genus of ſpars with twice three ſides, or ſix planes, being formed of two trigonal pyramids joined baſe to baſe, without any intermediate column. See Spar.

The ſpecies of ditrihedria are diſtinguiſhed by the different figures of theſe pyramids.

DITTANY, in botany. See Dictamnus.

DITTO, in books of accounts, uſually written D^o, ſignifies the aforementioned. The word is corrupted from the Italian *detto*, "the ſaid:" as in our law-phraſe, "the ſaid premiſes," meaning the ſame as were aforementioned.

DIVAL, in heraldry, the herb nightſhade, uſed by ſuch as blazon by flowers and herbs, inſtead of colours and metals, for ſable or black.

DIVAN, a council-chamber, or court of juſtice, among the eaſtern nations, particularly the Turks.—The word is Arabic, and ſignifies the ſame with sofa in the Turkiſh dialect.

Divan-*Beghi*, the ſuperintendant of juſtice in Perſia, whoſe place is the laſt of the ſix miniſters of the ſecond rank, who are all under the athemadauler, or firſt miniſter. To this tribunal of the divan-beghi he appeals from ſentences paſſed by the governors: he has a fixed ſtipend of 50,000 crowns for adminiſtering juſtice: all the ſerjeants, uſhers, &c. of the court, are in his ſervice: he takes cogniſance of the criminal cauſes of the chams, governors, and other great lords of Perſia, when accuſed of any fault. There are divan-beghis not only at court and in the capital, but alſo in the provinces and other cities of the empire. The alcoran is the ſole rule of his adminiſtration of juſtice, which alſo he interprets at pleaſure. He takes no cognizance of civil cauſes; but all differences ariſing between the officers of the king's houſhold, and between foreign miniſters, are determined by him.

DIVANDUROW, the name of ſeven iſlands which lie a league north of the Maldives, and twenty-four from the coaſt of Malabar, almoſt oppoſite to Cananor.

DIVER, in ornithology. See Colymbus.

DIVERGENT, or diverging, Lines, in geometry, are thoſe which conſtantly recede from each other.

Divergent *Rays*, in optics, are thoſe which, going from a point of the viſible object, are diſperſed, and continually depart one from another, in proportion as they are removed from the object: in which ſenſe it is oppoſed to convergent. See Optics.

DIVERSIFYING, in rhetoric, is of infinite ſervice to the orator; it is an accompliſhment eſſential to his character, and may fitly be called the ſubject of all his tropes and figures. Voſſius lays down ſix ways of diverſifying a ſubject. 1. By enlarging on what was briefly mentioned before. 2. By a conciſe enumeration of what had been inſiſted on at length. 3. By adding ſomething new to what is repeated. 4. By repeating only the principal heads of what had been ſaid. 5. By tranſpoſing the words and periods. 6. By imitating them.

DIVERSION, in military affairs, is when an enemy is attacked in one place where they are weak and unprovided, in order to draw off their forces from another place where they have made or intend to make an irruption. Thus the Romans had no other way in their power of driving Hannibal out of Italy, but by making a diverſion in attacking Carthage.

DIVESTING, or Divestiture, in law, is uſed for the act of ſurrendering one's effects.

DIVIDEND, in arithmetic, the number propoſed to be divided into equal parts *.

* See Arithmetic, n° 14.

DIVIDEND *of Stocks*, is a ſhare or proportion of the intereſt of ſtocks erected on public funds, as the ſouth-ſea, &c. divided among and paid to the adventurers half-yearly.

DIVINATION, the knowledge of things obſcure, or future, which cannot be attained by any natural means.

It was a received opinion among the heathens, that the gods were wont to converſe familiarly with ſome men, whom they endowed with extraordinary powers, and admitted to the knowledge of their councils and deſigns. Plato, Ariſtotle, Plutarch, Cicero, and others, divide divination into two ſorts or ſpecies, *viz.* natural and artificial.

The former was ſo called, becauſe not attained by any rules or precepts of art, but infuſed or inſpired into the diviner, without his taking any further care about it than to purify and prepare himſelf for the reception of the divine afflatus. Of this kind were all thoſe who delivered oracles, and foretold future events by inſpiration, without obſerving external ſigns or accidents.

The ſecond ſpecies of divination was called *artificial*, becauſe it was not obtained by immediate inſpiration, but proceeded upon certain experiments and obſervations arbitrarily inſtituted, and moſtly ſuperſtitious. Of this ſort there were various kinds, as by ſacrifices, entrails, flame, cakes, flour, wine, water, birds, lots, verſes, omens, &c.

In holy ſcripture we find mention made of nine different kinds of divination. The firſt performed by the inſpection of planets, ſtars, and clouds: it is ſuppoſed to be the practiſers of this, whom Moſes calls מעונן *meonen*, of ענן *anan*, "cloud," Deuter. ch. xviii. v. 10. 2. Thoſe, whom the prophet calls in the ſame place מנחש *menacheſeh*, which the vulgate and generality of interpreters render *augur*. 3. Thoſe who in the ſame place are called מבשף *mecaſcheph*, which the ſepuagint and vulgate tranſlate *a man given to ill practices*. 4. Such authors, whom Moſes in the ſame chapter, ver. 11. calls הובר *hhober*. 5. Thoſe, who conſult the ſpirits called *Python*; or, as Moſes expreſſes it in the ſame book, שאל אוב, thoſe who aſk queſtions of Python. 6. Witches, or magicians, whom Moſes calls ידעני *judeoni*. 7. Thoſe who conſult the dead, *necromancers*. 8. The prophet Hoſea, chap. iv. ver. 12. mentions ſuch as conſult ſtaves, שאל מקלו; which kind of divination may be called *rhabdomancy*. 9. The laſt kind of divination mentioned in ſcripture is *hepatoſcopy*, or the conſideration of the liver.

Divination of all kinds was neceſſarily made an occult ſcience, which naturally remained in the hands of the prieſts and prieſteſſes, the magi, the ſoothſayers, the augurs, the viſionaries, the prieſts of the oracles, the falſe prophets, and other like profeſſors, till the time of the coming of Jeſus Chriſt. The light of the goſpel, it is true, has diſſipated much of this darkneſs; but it is more difficult, than is commonly conceived, to eradicate from the human mind a deep-rooted ſuperſtition, even though the truth be ſet in the ſtrongeſt light, eſpecially when the error has been believed almoſt from the origin of the world: ſo we ſtill find exiſting among us the remains of this pagan ſuperſtition, in the following chimeras, which enthuſiaſtic and deſigning men have formed into arts and ſciences; tho' it muſt be owned, to the honour of the 18th century, that the pure doctrines of Chriſtianity, and the ſpirit of philoſophy, which become every day more diffuſed, equally concur in baniſhing theſe viſionary opinions. The vogue for theſe pretended ſciences and arts, moreover, is paſt, and they can no longer be named without exciting ridicule in all ſenſible people. By relating them here, therefore, and drawing them from their obſcurity, we only mean to ſhow their futility, and to mark thoſe rocks againſt which the human mind, without the aſſiſtance of a pilot, might eaſily run.

For the attaining of theſe ſupernatural qualifications, there are ſtill exiſting in the world the remains of,

1. *Aſtrology*: a conjectural ſcience which teaches to judge of the effects and influences of the ſtars; and to predict future events by the ſituation of the planets and their different aſpects. It is divided into *natural aſtrology*, or *meteorology*; which is confined to the foretelling of natural effects, as the winds, rain, hail, and ſnow, froſts and tempeſts. In this conſiſts one branch of the art of almanack-makers; and by merely confronting theſe predictions in the calendar, with the weather each day produces, every man of ſenſe will ſee what regard is to be paid to this part of aſtrology. The other part, which is called *judicial aſtrology*, is ſtill far more illuſive and raſh than the former: and having been at firſt the wonderful art of viſionaries, it afterwards became that of impoſtors; a very common fate with all thoſe chimerical ſciences, of which we ſhall here ſpeak. This art pretends to teach the method of predicting all ſorts of events that ſhall happen upon the earth, as well ſuch as relate to the public, as to private perſons; and that by the ſame inſpection of the ſtars and planets, and their different conſtellations. The *cabala* ſignifies, in like manner, the knowledge of things that are above the moon, as the celeſtial bodies and their influences; and in this ſenſe it is the ſame with judicial aſtrology, or makes a part of it.

2. *Horoſcopy*, which may alſo be conſidered as a part of aſtrology, is the art by which they draw a figure, or celeſtial ſcheme, containing the 12 houſes, wherein they mark the diſpoſition of the heavens at a certain moment; for example, that at which a man is born, in order to foretel his fortune, or the incidents of his life. In a word, it is the diſpoſition of the ſtars and planets at the moment of any perſon's birth. But as there cannot be any probable or poſſible relation between the conſtellations and the human race, all the principles they lay down, and the prophecies they draw from them, are chimerical, falſe, abſurd, and a criminal impoſition on mankind.

3. The art of *augury* conſiſted, among the ancient Romans, in obſerving the flight, the ſinging and eating of birds, eſpecially ſuch as were held ſacred *.

* See *Augury*

4. The equally deceitful art of *haruſpicy* conſiſted, on the contrary, in the inſpection of the bowels of animals, but principally of victims; and from thence predicting grand incidents relative to the republic, and the good or bad events of its enterpriſes.

5. *Aeromancy* was the art of divining by the air. This vain ſcience has alſo come to us from the Pagans: but is rejected by reaſon as well as Chriſtianity, as falſe and abſurd.

6. *Pyromancy* is a divination made by the inſpection of a flame, either by obſerving to which ſide it turns, or by throwing into it ſome combuſtible matter, or a bladder filled with wine, or any thing elſe from which they imagined they were able to predict.

7. *Hydromancy* is the ſuppoſed art of divining by water. The Perſians, according to Varro, invented it; Pythagoras and Numa Pompilius made uſe of it; and we ſtill admire like the wonderful prognoſticators.

8. *Geomancy* was a divination made by obſerving of cracks or clefts in the earth. It was alſo performed by points made on paper, or any other ſubſtance, at a venture; and they judged of future events from the figures that reſulted from thence. This was certainly very ridiculous; but it is nothing leſs ſo to pretend to predict future events by the inſpection of the grounds of a diſh of tea or coffee, or by cards, and many other like matters.—Thus have deſigning men made uſe of the four elements to deceive their credulous brethren.

9. *Chiromancy* is the art which teaches to know, by inſpecting the hand, not only the inclinations of a man, but his future deſtiny alſo. The fools or impoſtors who practiſe this art pretend, that the different parts or the lines of the hand have a relation to the internal parts of the body, as ſome to the heart, others to the liver, ſpleen, &c. On this falſe ſuppoſition, and on many others equally extravagant, the principles of chiromancy are founded: and on which, however, ſeveral authors, as Robert Flud an Engliſhman, Artemidorus, M. de la Chambre, John of Indagina, and many others, have wrote large treatiſes.

10. *Phyſiognomy*, or *phyſiognomancy*, is a ſcience that pretends to teach the nature, the temperament, the underſtanding, and the inclinations of men, by the inſpection of their countenances, and is therefore very little leſs frivolous than chiromancy; tho' Ariſtotle, and a number of learned men after him, have wrote expreſs treatiſes concerning it.

DIVINE, ſomething relating to God. The word is alſo uſed, figuratively, for any thing that is excellent, extraordinary, and that ſeems to go beyond the power of nature and the capacity of mankind. In which ſenſe, the compaſs, teleſcope, clocks, &c. are ſaid to be *divine inventions:* Plato is called the *divine author*, the *divine Plato;* and the ſame appellation is given to Seneca: Hippocrates is called, "the divine old man," *divinus ſenex*, &c.

DIVING, the art or act of deſcending under water to conſiderable depths, and abiding there a competent time.

The uſes of *diving* are very conſiderable, particularly in the fiſhing for pearls, corals, ſpunges, &c. See PEARL-*Fiſhing*, &c.

There have been various methods propoſed, and machines contrived, to render the buſineſs of diving more ſafe and eaſy. The great point is to furniſh the diver with freſh air; without which, he muſt either make a ſhort ſtay, or periſh.

Thoſe who dive for ſpunges in the Mediterranean, help themſelves by carrying down ſpunges dipt in oil in their mouths. But conſidering the ſmall quantity of air that can be contained in the pores of a ſpunge, and how much that little will be contracted by the preſſure of the incumbent water, ſuch a ſupply cannot long ſubſiſt the diver. For it is found by experiment, that a gallon of air included in a bladder, and by a pipe reciprocally inſpired and exſpired by the lungs, becomes unfit for reſpiration in little more than one minute of time. For though its elaſticity be but little altered in paſſing the lungs, yet it loſes its vivifying ſpirit, and is rendered effete.

In effect, a naked diver, Dr Halley aſſures us, without a ſpunge, cannot remain above a couple of minutes encloſed in water; nor much longer with one, without ſuffocating; nor, without long practice, near ſo long; ordinary perſons beginning to ſtifle in about half a minute. Beſides, if the depth be conſiderable, the preſſure of the water in the veſſels makes the eyes blood-ſhotten, and frequently occaſions a ſpitting of blood.

Hence, where there has been occaſion to continue long at the bottom, ſome have contrived double flexible pipes, to circulate air down into a cavity, incloſing the diver as with armour, both to furniſh air, and to bear off the preſſure of the water and give leave to his breaſt to dilate upon inſpiration; the freſh air being forced down one of the pipes with bellows, and returning by the other of them, not unlike to an artery and vein.

But this method is impracticable when the depth ſurpaſſes three fathoms; the water embracing the bare limbs ſo cloſely as to obſtruct the circulation of the blood in them; and withal preſſing ſo ſtrongly on all the junctures where the armour is made tight with leather, that, if there be the leaſt defect in any of them, the water ruſhes in, and inſtantly fills the whole engine, to the great danger of the diver's life.

It is certain, however, that people, by being accuſtomed to the water from their infancy, will at length be enabled, not only to ſtay much longer under water than the time above-mentioned, but put on a kind of amphibious nature, ſo that they ſeem to have the uſe of all their faculties as well when their bodies are immerſed in water, as when they are on dry land. Moſt ſavage nations are remarkable for this. According to the accounts of our late voyagers, the inhabitants of the South-ſea iſlands are ſuch expert divers, that when a nail or any piece of iron was thrown overboard, they would inſtantly jump into the ſea after it, and never failed to recover it notwithſtanding the quick deſcent of the metal. Even among civilized nations, many perſons have been found capable of continuing an incredible length of time below water. The moſt remarkable inſtance of this kind is the famous Sicilian diver *Nicolo Peſce*. The authenticity of the account, indeed, depends entirely on the authority of F. Kircher. He aſſures us, that he had it from the archives of the kings of Sicily: but, notwithſtanding this aſſertion, the whole hath ſo much of the marvellous in it, that we believe there are few who will not look upon it to have been exaggerated. "In the times of Frederic king of Sicily, (ſays Kircher), there lived a celebrated diver, whoſe name was *Nicholas*, and who, from his amazing ſkill in ſwimming, and his perſeverance under water, was ſurnamed the *fiſh*. This man had from his infancy been uſed to the ſea; and earned his ſcanty ſubſiſtence by diving for corals and oyſters, which he ſold to the villagers on ſhore. His long acquaintance with the ſea, at laſt, brought it to be almoſt his natural element. He was frequently known to ſpend five days in the midſt of the waves, without any other proviſions than the fiſh which he caught there and ate raw. He often ſwam over from Sicily into Calabria, a tempeſtuous and dangerous paſſage, carrying letters from the king. He was frequently known to ſwim among the gulphs of the Lipari iſlands, noway apprehenſive of danger.

“ Some mariners out at ſea, one day obſerved ſomething at ſome diſtance from them, which they regarded as a ſea-monſter; but upon its approach it was known to be Nicholas, whom they took into their ſhip. When they aſked him whither he was going in ſo ſtormy and rough a ſea, and at ſuch a diſtance from land, he ſhewed them a packet of letters, which he was carrying to one of the towns of Italy, exactly done up in a leather bag, in ſuch a manner as that they could not be wetted by the ſea. He kept them thus company for ſome time on their voyage, converſing, and aſking queſtions; and after eating an hearty meal with them, he took his leave, and, jumping into the ſea, purſued his voyage alone.

“ In order to aid theſe powers of enduring in the deep, nature ſeemed to have aſſiſted him in a very extraordinary manner: for the ſpaces between his fingers and toes were webbed, as in a gooſe; and his cheſt became ſo very capacious, that he could take in, at one inſpiration, as much breath as would ſerve him for a whole day.

“ The account of ſo extraordinary a perſon did not fail to reach the king himſelf; who commanded Nicholas to be brought before him. It was no eaſy matter to find Nicholas, who generally ſpent his time in the ſolitudes of the deep; but, at laſt, after much ſearching, he was found, and brought before his majeſty. The curioſity of this monarch had been long excited by the accounts he had heard of the bottom of the gulph of Charybdis; he now therefore conceived, that it would be a proper opportunity to have more certain information. He therefore commanded our poor diver to examine the bottom of this dreadful whirlpool; and as an incitement to his obedience, he ordered a golden cup to be flung into it. Nicholas was not inſenſible of the danger to which he was expoſed; dangers beſt known only to himſelf; and therefore he preſumed to remonſtrate: but the hopes of the reward, the deſire of pleaſing the king, and the pleaſure of ſhewing his ſkill, at laſt prevailed. He inſtantly jumped into the gulph, and was as inſtantly ſwallowed up in its boſom. He continued for three quarters of an hour below; during which time the king and his attendants remained on ſhore, anxious for his fate; but he at laſt appeared, holding the cup in triumph in one hand, and making his way good among the waves with the other. It may be ſuppoſed he was received with applauſe when he came on ſhore: the cup was made the reward of his adventure; the king ordered him to be taken proper care of; and, as he was ſomewhat fatigued and debilitated by his labour, after an hearty meal he was put to bed, and permitted to refreſh himſelf by ſleeping.

“ When his ſpirits were thus reſtored, he was again brought to ſatiſfy the king's curioſity with a narrative of the wonders he had ſeen; and his account was to the following effect. He would never, he ſaid, have obeyed the king's commands, had he been appriſed of half the dangers that were before him. There were four things, he ſaid, which rendered the gulph dreadful, not only to men, but to fiſhes themſelves. 1. The force of the water burſting up from the bottom, which required great ſtrength to reſiſt. 2. The abruptneſs of the rocks that on every ſide threatened deſtruction. 3. The force of the whirlpool daſhing againſt thoſe rocks. And, 4. The number and magnitude of the polypous fiſh, ſome of which appeared as large as a man; and which, every where ſticking againſt the rocks, projected their fibrous arms to entangle him. Being aſked how he was able ſo readily to find the cup that had been thrown in, he replied, that it happened to be flung by the waves into the cavity of a rock againſt which he himſelf was urged in his deſcent. This account, however, did not ſatisfy the king's curioſity: being requeſted to venture once more into the gulph for further diſcoveries, he at firſt refuſed: but the king, deſirous of having the moſt exact information poſſible of all things to be found in the gulph, repeated his ſolicitations; and, to give them ſtill greater weight, produced a larger cup than the former, and added alſo a purſe of gold. Upon theſe conſiderations the unfortunate diver once again plunged into the whirlpool, and was never heard of more.”

To obviate the inconveniencies of diving to thoſe who have not the extraordinary powers of the diver above-mentioned, different inſtruments have been contrived. The chief of theſe is the *diving-bell;* which is moſt conveniently made in form of a truncated cone, the ſmaller baſe being cloſed, and the larger open. It is to be poiſed with lead; and ſo ſuſpended, that the veſſel may ſink full of air, with its open baſis downward, and as near as may be in a ſituation parallel to the horizon, ſo as to cloſe with the ſurface of the water all at once.

Under this covercle the diver ſitting, ſinks down with the included air to the depth deſired: and if the cavity of the veſſel can contain a tun of water, a ſingle man may remain a full hour, without much inconvenience, at five or ſix fathoms deep. But the lower you go, ſtill the included air contracts itſelf according to the weight of the water which compreſſes it: ſo that at 33 foot deep the bell becomes half full of water, the preſſure of the incumbent water being then equal to that of the atmoſphere; and at all other depths the ſpace occupied by the compreſſed air in the upper part of the bell will be to the under part of its capacity filled with water, as 33 feet to the ſurface of the water in the bell below the common ſurface thereof. And this condenſed air being taken in with the breath ſoon inſinuates itſelf into all the cavities of the body, and has no ill effect, provided the bell be permitted to deſcend ſo ſlowly as to allow time for that purpoſe. One inconvenience that attends it, is found in the ears, within which there are cavities which open only outwards, and that by pores ſo ſmall as not to give admiſſion even to the air itſelf, unleſs they be dilated and diſtended by a conſiderable force. Hence, on the firſt deſcent of the bell, a preſſure begins to be felt on each ear; which, by degrees, grows painful, till the force overcoming the obſtacle, what conſtringes theſe pores yields to the preſſure, and letting ſome condenſed air ſlip in, preſently eaſe enſues. The bell deſcending lower, the pain is renewed, and again eaſed in the ſame manner.

But the greateſt inconvenience of this engine, is, that the water entering it, contracts the bulk of air into ſo ſmall a compaſs, that it ſoon heats and becomes unfit for reſpiration: ſo that there is a neceſſity for its being drawn up to recruit it; beſides the uncomfortable abiding of the diver almoſt covered with water.

To obviate the difficulties of the diving-bell, Dr Halley, to whom we owe the preceding account, contrived ſome further apparatus, whereby not only to recruit and refreſh the air from time to time, but alſo to keep the water wholly out of it at any depth. The manner in which this was effected, he relates in the following words.

“ The bell I made uſe of was of wood, containing about 60 cubic feet in its concavity; and was of the form of a truncate cone, whoſe diameter at the top was three feet, and at the bottom five. This I coated with lead ſo heavy that it would ſink empty; and I diſtributed the weight ſo about its bottom, that it would go down in a perpendicular direction, and no other. In the top I fixed a ſtrong but clear glaſs, as a window, to let in the light from above; and likewiſe a cock to let out the hot air that had been breathed: and below, about a yard under the bell, I placed a ſtage which hung by three ropes, each of which was charged with about one hundred weight to keep it ſteady. This machine I ſuſpended from the maſt of a ſhip by a ſprit, which was ſufficiently ſecured by ſtays to the maſthead, and was directed by braces to carry it overboard clear of the ſhip's ſide, and to bring it again within board as occaſion required.

“ To ſupply air to this bell when under water, I cauſed a couple of barrels of about 36 gallons each to be caſed with lead, ſo as to ſink empty; each of them having a bung-hole in its loweſt parts to let in the water, as the air in them condenſed on their deſcent; and to let it out again when they were drawn up full from below. And to a hole in the uppermoſt part of theſe barrels, I fixed a leathern trunk or hoſe well liquored with bees wax and oil, and long enough to fall below the bung-hole, being kept down by a weight appended: ſo that the air in the upper part of the barrels could not eſcape, unleſs the lower ends of theſe hoſe were firſt lifted up.

“ The air-barrels being thus prepared, I fitted them with tackle proper to make them riſe and fall alternately, after the manner of two buckets in a well; which was done with ſo much eaſe, that two men, with leſs than half their ſtrength, could perform all the labour required: and in their deſcent they were directed by lines faſtened to the under edge of the bell, the which paſſed through rings on both ſides the leathern hoſe in each barrel; ſo that, ſliding down by theſe lines, they came readily to the hand of a man who ſtood on the ſtage on purpoſe to receive them, and to take up the ends of the hoſe into the bell. Through theſe hoſe, as ſoon as their ends came above the ſurface of the water in the barrels, all the air that was included in the upper parts of them was blown with great force into the bell; whilſt the water entered at the bung-holes below, and filled them: and as ſoon as the air of one barrel had been thus received, upon a ſignal given, that was drawn up, and at the ſame time the other deſcended; and, by an alternate ſucceſſion, furniſhed air ſo quick, and in ſo great plenty, that I myſelf have been one of five who have been together at the bottom in nine or ten fathom water, for above an hour and an half at a time, without any ſort of ill conſequence: and I might have continued there as long as I pleaſed, for any thing that appeared to the contrary. Beſides, the whole cavity of the bell was kept entirely free from water, ſo that I ſat on a bench which was diametrically placed near the bottom, wholly dreſſed, with all my cloaths on. I only obſerved, that it was neceſſary to be let down gradually at firſt, as about 12 feet at a time; and then to ſtop and drive out the air that entered, by receiving three or four barrels of freſh air before I deſcended further. But being arrived at the depth deſigned, I then let out as much of the hot air that had been breathed, as each barrel would repleniſh with cool, by means of the cock at the top of the bell; through whoſe aperture, though very ſmall, the air would ruſh with ſo much violence, as to make the ſurface of the ſea boil, and to cover it with a white foam, notwithſtanding the weight of the water over us.

“ Thus I found that I could do any thing that required to be done juſt under us; and that, by taking off the ſtage, I could, for a ſpace as wide as the circuit of the bell, lay the bottom of the ſea ſo far dry, as not to be overſhoes thereon. And, by the glaſs window, ſo much light was tranſmitted, that when the ſea was clear, and eſpecially when the ſun ſhone, I could ſee perfectly well to write or read; much more to faſten or lay hold on any thing under us that was to be taken up. And, by the return of the air-barrels, I often ſent up orders written with an iron pen, on ſmall plates of lead, directing how to move us from place to place as occaſion required. At other times, when the water was troubled and thick, it would be as dark as night below; but in ſuch caſes I have been able to keep a candle burning in the bell as long as I pleaſed, notwithſtanding the great expence of air neceſſary to maintain flame.—By an additional contrivance, I have found it not impracticable for a diver to go out of an engine to a good diſtance from it, the air being conveyed to him with a continued ſtream, by ſmall flexible pipes; which pipes may ſerve as a clue, to direct him back again, when he would return to the bell.”

Plate XCIV. fig. 1. ſhews Dr Halley's diving bell, with the divers at work. DBLKRIMP repreſents the body of the bell. D, the glaſs which ſerves as a window. B, the cock for letting out the air which has been breathed. LM, the ſeats. C, one of the air-barrels. P, H, two of the divers. F, another diver at a diſtance from the bell, and breathing through the flexible tube K.—This diver is ſuppoſed to have a head-piece of lead, made to fit quite cloſe about his ſhoulders: this head-piece was capable of containing as much air as would ſupply him for a minute or two. When he had occaſion for more air, he turned a cock at F, by which means a communication was opened with the air in the bell, and thus he could receive a new ſupply at pleaſure.

Since the invention of this diving machine, there has been one contrived by Mr Triewald, F. R. S. and military architect to the king of Sweden, which, for a ſingle

Fig. 2.

ſingle perſon, is in ſome reſpects thought to be more eligible than Dr Halley's, and is conſtructed as follows. AB is the bell, which is ſunk by lead weights DD hung to its bottom. This bell is of copper, and tinned all over in the inſide, which is illuminated by three ſtrong convex lenſes, G, G, G, with copper lids H, H, H, to defend them. The iron ring or plate E ſerves the diver to ſtand on when he is at work; and is ſuſpended at ſuch a diſtance from the bottom of the bell by the chains F, F, F, that when the diver ſtands upright, his head is juſt above the water in the bell, where the air is much better than higher up, becauſe it is colder, and conſequently more fit for reſpiration. But as the diver muſt always be within the bell, and his head of courſe in the upper part, the inventor has contrived, that even there, when he has breathed the hot air as well as he can, he may, by means of a ſpiral copper tube *bc*, placed cloſe to the inſide of the bell, draw the cooler and freſher air from the lowermoſt parts: for which purpoſe, a flexible leather tube, about two feet long, is fixed to the upper end of the copper tube at *b*; and to the other end of this tube is fixed an ivory mouth-piece, by which the diver draws in the air.

Fig. 3

The greateſt improvement, however, which the diving bell ever has received, or probably can receive, is from Mr Spalding of Edinburgh. A ſection of his improved diving-bell is repreſented fig. 3. This conſtruction is deſigned to remedy ſome inconveniencies of Dr Halley's, which are very evident, and of very dangerous tendency. Theſe are, 1. By Dr Halley's conſtruction, the ſinking or raiſing of the bell depends entirely on the people who are at the ſurface of the water; and as the bell even when in the water has a very conſiderable weight, the raiſing it not only requires a great deal of labour, but there is a poſſibility of the rope breaking by which it is raiſed, and thus every perſon in the bell would inevitably periſh. 2. As there are, in many places of the ſea, rocks which lie at a conſiderable depth, the figure of which cannot poſſibly be perceived from above, there is danger that ſome of their ragged prominences may catch hold of one of the edges of the bell in its deſcent, and thus overſet it before any ſignal can be given to thoſe above, which would infallibly be attended with the deſtruction of the people in the bell: and as it muſt always be unknown, before trial, what kind of a bottom the ſea has in any place, it is plain, that, without ſome contrivance to obviate this laſt danger, the deſcent in Dr Halley's diving-bell is not at all eligible.

How theſe inconveniencies are remedied by Mr Spalding's new conſtruction will be eaſily underſtood from the following deſcription.—ABCD repreſents a ſection of the bell, which is made of wood: *e, e*, are iron hooks, by means of which it is ſuſpended by ropes QBF*e*, and QAER*e*, and QS, as expreſſed in the figure: *c, c*, are iron hooks, to which are appended lead weights, that keep the mouth of the bell always parallel to the ſurface of the water, whether the machine taken all together is lighter or heavier than an equal bulk of water. By theſe weights alone, however, the bell would not ſink: another is therefore added, repreſented at L; and which can be raiſed or lowered at pleaſure, by means of a rope paſſing over the pulley *a*, and faſtened to one of the ſides of the bell at M. As the bell deſcends, this weight, called by Mr Spalding the *balance-weight*, hangs down a conſiderable way below the mouth of the bell. In caſe the edge of the bell is catched by any obſtacle, the balance-weight is immediately lowered down ſo that it may reſt upon the bottom. By this means the bell is lightened ſo that all danger of overſetting is removed; for, being lighter, without the balance-weight, than an equal bulk of water, it is evident that the bell will riſe, as far as the length of the rope affixed to the balance-weight will allow it. This weight, therefore, will ſerve as a kind of anchor to keep the bell at any particular depth which the divers may think neceſſary; or by pulling it quite up, the deſcent may be continued to the very bottom.

By another very ingenious contrivance, Mr Spalding hath rendered it poſſible for the divers to raiſe the bell, with all the weights appended to it, even to the ſurface, or to ſtop at any particular depth, as they think proper; and thus they could ſtill be ſafe, even though the rope deſigned for pulling up the bell was broke. For this purpoſe the bell is divided into two cavities, both of which are made as tight as poſſible. Juſt above the ſecond bottom EF, are ſmall ſlits in the ſides of the bell; through which the water, entering as the bell deſcends, diſplaces the air originally contained in this cavity, which flies out at the upper orifice of the cock GH, When this is done, the divers turn the handle G, which ſtops the cock; ſo that if any more air was to get into the cavity AEFB, it could not longer be diſcharged through the orifice H as before. When this cavity is full of water, the bell ſinks; but when a conſiderable quantity of air is admitted, it riſes. If therefore the divers have a mind to raiſe themſelves, they turn the ſmall cock *g*, by which a communication is made between the upper and under cavities of the bell. The conſequence of this is, that a quantity of air immediately enters the upper cavity, forces out a quantity of the water contained in it, and thus renders the bell lighter by the whole weight of the water which is diſplaced. Thus, if a certain quantity of air is admitted into the upper cavity, the bell will deſcend very ſlowly; if a greater quantity, it will neither aſcend nor deſcend, but remain ſtationary; and if a larger quantity of air is ſtill admitted, it will ariſe to the top. It is to be obſerved, however, that the air which is thus let out into the upper cavity muſt be immediately replaced from the air-barrel; and the air is to be let out very ſlowly, or the bell will riſe to the top with ſo great velocity that the divers will be in danger of being ſhaken out of their ſeats. But, by following theſe directions, every poſſible accident may be prevented, and people may deſcend to great depths without the leaſt apprehenſion of danger. The bell alſo becomes ſo eaſily manageable in the water, that it may be conducted from one place to another by a ſmall boat with the greateſt eaſe, and with perfect ſafety to thoſe who are in it.

Inſtead of wooden ſeats uſed by Dr Halley, Mr Spalding makes uſe of ropes ſuſpended by hooks *bbb*; and on theſe ropes the divers may ſit without any inconvenience. I and K are two windows made of thick ſtrong glaſs, for admitting light to the divers. N repreſents an air-caſk with its tackle, and OCP the flex-

Fig. 4.

ible pipe through which the air is admitted to the bell. In the aſcent and deſcent of this caſk the pipe is kept down by a ſmall weight appended, as in Dr Halley's machine. R is a ſmall cock by which the hot air is diſcharged as often as it becomes troubleſome. Fig. 4. is a repreſentation of the whole diving apparatus, which it is hoped will be readily underſtood without any further explanation. Two air-barrels are repreſented in this figure; but Mr Spalding is of opinion, that one capable of containing 30 gallons is ſufficient for an ordinary machine.

We are told of another method put in practice by a gentleman of Devonſhire. He has contrived a large caſe of ſtrong leather, perfectly water-proof, which may hold about half an hogſhead of air. This is ſo contrived, that, when he ſhuts himſelf up in this caſe, he may walk at the bottom of the ſea, and go into any part of a wrecked veſſel, and deliver out the goods. This method, we are told, he has practiſed for many years, and has thus acquired a large fortune. It would be a conſiderable improvement on this machine to condenſe the air in it as much as poſſible before the diver deſcended; as he would thus be furniſhed with an atmoſphere endued with elaſticity ſufficient to reſiſt the weight of the water, which otherwiſe would ſqueeze his caſe into much leſs room than it originally took up. The condenſed air alſo would ſerve for reſpiration a much longer time than that which is in its ordinary ſtate.

Diving-*Bladder*, a machine invented by Borelli, and by him preferred, though without any good reaſon, to the diving-bell. It is a globular veſſel of braſs or copper, about two feet in diameter, which contains the diver's head. It is fixed to a goat's-ſkin habit exactly fitted to his perſon. Within the veſſel are pipes, by means of which a circulation of air is contrived; and the perſon carries an air-pump by his ſide, by which he can make himſelf heavier or lighter as fiſhes do, by contracting or dilating their air-bladder. By this means he thought all the objections to which other diving machines are liable were entirely obviated, and particularly that of want of air; the air which had been breathed, being, as he imagined, deprived of its noxious qualities by circulating through the pipes. Theſe advantages, however, it is evident, are only imaginary. The diver's limbs, being defended from the preſſure of the water only by a goat's ſkin, would infallibly be cruſhed if he deſcended to any conſiderable depth; and from the diſcoveries now made by Dr Prieſtley and others, it is abundantly evident, that air, which is once rendered foul by breathing, cannot in any degree be reſtored by circulation through pipes. Concerning the uſe of copper machines in general, Mr Spalding has favoured us with the following curious obſervation, namely, That when a perſon has breathed in them a few minutes, he feels in his mouth a very diſagreeable braſſy taſte, which continues all the time he remains in the veſſel; ſo that, on this account, copper ſeems by no means an eligible material. This taſte moſt probably ariſes from the action of the alkaleſcent effluvia of the body upon the copper; for volatile alkali is a ſtrong diſſolvent of this metal: but how theſe effluvia volatiliſe the copper in ſuch a manner as to make the taſte of it ſenſible in the mouth, is not eaſy to ſay.

DIVINITY, properly ſignifies the nature, quality, and eſſence of God.

Divinity, is alſo uſed in the ſame ſenſe with theology.

DIVISIBILITY, that property by which the particles of matter in all bodies are capable of a ſeparation or diſunion from each other.

The Peripatetics and Carteſians hold diviſibility to be an affection of all matter. The Epicureans, again, allow it to agree to every phyſical continuum; but they deny that this affection agrees to all bodies, for the primary corpuſcles or atoms they maintain to be perfectly inſecable and indiviſible.

As it is evident that body is extended, ſo it is no leſs evident that it is diviſible: for ſince no two particles of matter can exiſt in the ſame place, it follows, that they are really diſtinct from each other; which is all that is meant by being diviſible. In this ſenſe the leaſt conceivable particle muſt ſtill be diviſible, ſince it will conſiſt of parts which will be really diſtinct. To illuſtrate this by a familiar inſtance. Let the leaſt imaginable piece of matter be conceived lying on a ſmooth plain ſurface, it is evident the ſurface will not touch it every where: thoſe parts therefore which it does not touch, may be ſuppoſed ſeparable from the others, and ſo on, as far as we pleaſe; and this is all that is meant when we ſay matter is infinitely diviſible.

Pl. XCII fig. 2.

The infinite diviſibility of mathematical quantity is demonſtrated thus geometrically. Suppoſe the line AD perpendicular to BF; and another, as GH, at a ſmall diſtance from it, alſo perpendicular to the ſame line: with the centers CCC, &c. deſcribe circles cutting the line GH in the points *eee*, &c. Now the greater the radius AC is, the leſs is the part *e*H. But the radius may be augmented in infinitum; ſo long, therefore, the part *e*H may be divided into ſtill leſs portions; conſequently it may be divided in infinitum.

All that is ſuppoſed in ſtrict geometry (ſays Mr Maclaurin) concerning the diviſibility of magnitude, amounts to no more than that a given magnitude may be conceived to be divided into a number of parts equal to any given or propoſed number. It is true, that the number of parts into which a given magnitude may be conceived to be divided, is not to be fixed or limited, becauſe no given number is ſo great but a greater may be conceived and aſſigned: but there is not, therefore, any neceſſity of ſuppoſing the number of parts actually infinite; and if ſome have drawn very abſtruſe conſequences from ſuch a ſuppoſition, yet geometry ought not to be loaded with them.

How far matter may actually be divided, may in ſome meaſure be conceived from hence, that a piece of wire gilt with ſo ſmall a quantity as eight grains of gold, may be drawn out to a length of 13,000 feet, the whole ſurface of it ſtill remaining covered with gold. We have alſo a ſurpriſing inſtance of the minuteneſs of ſome parts of matter from the nature of light and viſion. Let a candle be lighted, and placed in an open plain, it will then be viſible two miles round; and conſequently was it placed two miles above the ſurface of the earth, it would fill with luminous particles a ſphere whoſe diameter was four miles, and that before it had loſt any ſenſible part of its weight. A quantity of vitriol being diſſolved, and mixed with 9000 times as much water, will tinge the whole; conſequently will be divided into as many parts as there are

Plate XCIV.

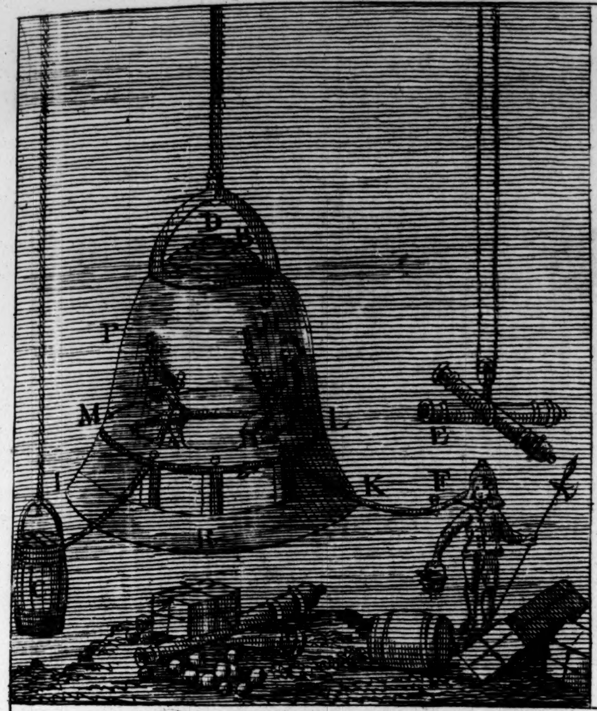


Fig. 1. Halley's DIVING BELL.

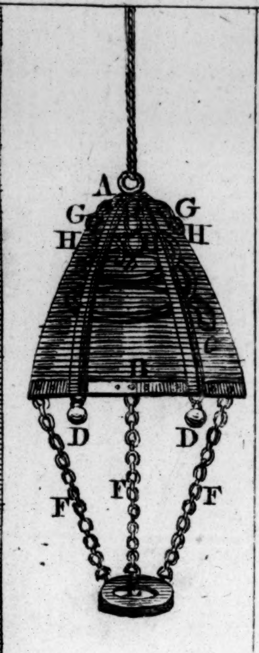


Fig. 2. Triewald's.

A
G
G
H
H
B
D
D
F
F
F

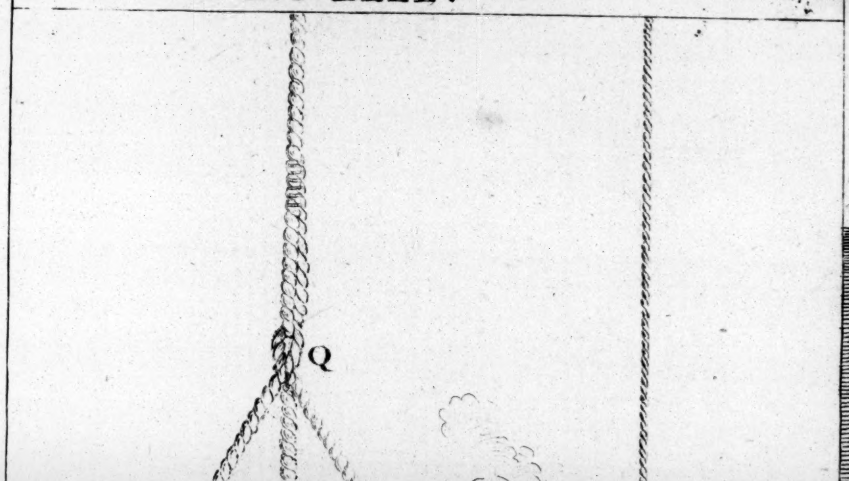


Fig. 3. Spalding's DIVING BELL.

Q
B
H
S
A
F
E
G
R
I
P
e
M
K
c
c
c
c
D
C
O
N
L

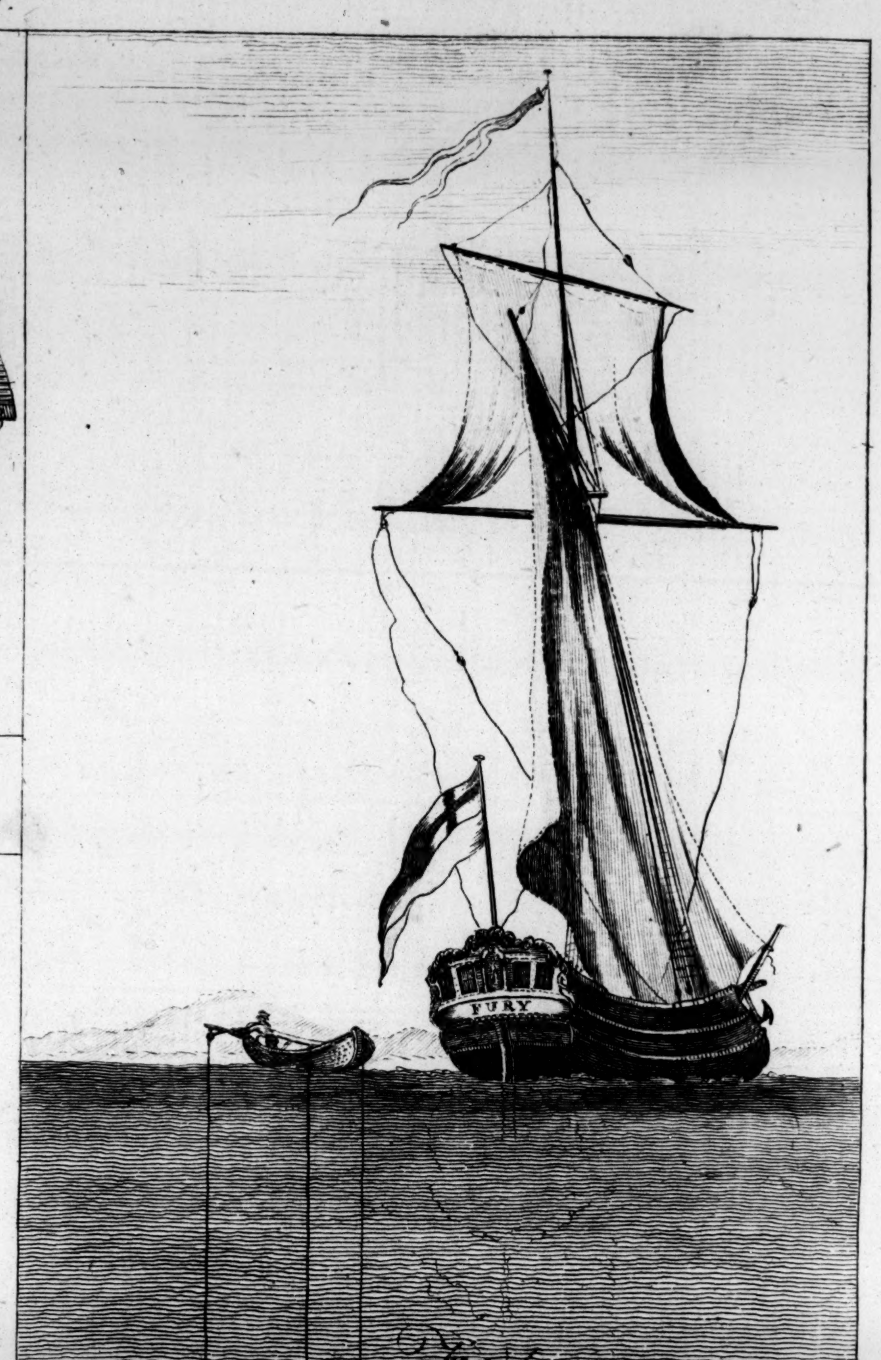


Fig. 4.

A. Bell Sculp^t.

3 MA 55

are viſible portions of matter in that quantity of water. There are perfumes, which, without a ſenſible diminution of their quantity, ſhall fill a very large ſpace with their odoriferous particles; which muſt therefore be of an inconceivable ſmallneſs, ſince there will be a ſufficient number in every part of that ſpace, ſenſibly to affect the organ of ſmelling. Dr Keill demonſtrates, that any particle of matter how ſmall ſoever, and any finite ſpace how large ſoever, being given, it is poſſible for that ſmall particle of matter to be diffuſed through all that ſpace, and to fill it in ſuch a manner, as that there ſhall be no pore in it whoſe diameter ſhall exceed any given line. See EFFLUVIA.

The chief objections againſt the diviſibility of matter in infinitum are, That an infinite cannot be contained by a finite; and that it follows from a diviſibility in infinitum, either that all bodies are equal, or that one infinite is greater than another. But the anſwer to theſe is eaſy; for the properties of a determined quantity are not to be attributed to an infinite conſidered in a general ſenſe; and who has ever proved that there could not be an infinite number of infinitely ſmall parts in a finite quantity, or that all infinites are equal? The contrary is demonſtrated by mathematicians in innumerable inſtances. See the article INFINITE, and '*S Graveſande Elem. Mathem. l.* i. *c.* 4.

DIVISION, in general, is the ſeparating a thing into two or more parts.

Mechanical DIVISION, ſignifies that ſeparation which is occaſioned in the parts of a body by help of mechanical inſtruments.—The mechanical diviſion of bodies does indeed ſeparate them into ſmaller, homogeneous, ſimilar parts; but this ſeparation cannot extend to the primary integrant molecules of any body; and conſequently is incapable of breaking what is properly called their *aggregation:* alſo, no union is formed betwixt the divided and dividing bodies, in which reſpect diviſion eſſentially differs from diſſolution.

Diviſion is not properly a chemical operation. It is only employed preparatorily to facilitate other operations, and particularly ſolution. For this purpoſe it is very uſeful, as it increaſes the quantity of ſurface, and conſequently the points of contact of any body.—Different methods are uſed to divide bodies according to their nature. Thoſe which are tenacious and elaſtic, as horns and gums, require to be cut, raſped, or filed. Metals, becauſe of their ductility, require the ſame treatment: but as they are alſo fuſible, they may be quickly and conveniently reduced into grains ſmall enough for moſt operations, by pouring them, when melted, into water. All brittle bodies may be reduced conveniently into fine parts by being bruiſed in a mortar with a peſtle. Very hard bodies, ſuch as glaſs, cryſtals, ſtones, particularly thoſe of the vitrifiable kind, before they are pounded, ought to be plunged when red-hot into water, by which they are ſplit and cracked, and rendered more eaſily pulverable. Bodies of this kind may alſo be bruiſed or ground by means of a hard and flat ſtone, upon which the matter is to be put, and bruiſed by another hard ſtone ſo ſmall as to be held and moved upon the larger ſtone with the hand. The larger ſtone is called a *porphyry*, from its being generally of that kind of ſtone; and the operation is called *porphyriſation.* Inſtead of porphyriſation, a mill may be uſed, compoſed of a hard grit milſtone, moving round upon another ſtone of the ſame kind, which muſt be fixed: in the upper ſtone is a groove, or channel, through which the matter to be ground paſſes. By this method a ſubſtance may be more quickly reduced to a fine powder than by porphyriſation. But theſe mills can be only employed for conſiderable quantities of matter.

Theſe methods of mechanically dividing bodies are attended with ſome practical inconveniencies; the moſt conſiderable of which is, that ſome parts of the dividing inſtruments are always ſtruck off, and mixed with the matter to be divided. This may greatly affect the operations. For inſtance, inſtruments of iron and copper furniſh metallic colouring particles, and copper is very prejudicial to health. Porphyry is coloured by a reddiſh brown matter, which injures the colour of cryſtal-glaſſes, enamels, and porcelains made with matters ground upon this ſtone. Theſe matters therefore muſt be cleanſed after their porphyriſation, or elſe no inſtruments capable of injuring the intended operations ought to be employed. Thus, for the preparation of all medicines to be taken internally, no copper inſtruments, as mortars, peſtles, &c. ought to be uſed; thoſe made of iron are preferable; and, inſtead of porphyries, mortars, grinding-ſtones and millſtones made of hard and white ſtones ought to be employed for ſubſtances which are to enter into the compoſition of enamels, cryſtal-glaſs, and porcelain, the whiteneſs of which is a moſt neceſſary quality.

DIVISION, in algebra. See ALGEBRA, n° 7.

DIVISION, in arithmetic. See ARITHMETIC, n° 11.

DIVISION, in ſea affairs, a ſelect number of ſhips in a fleet or ſquadron of men of war, diſtinguiſhed by a particular flag or pendant, and uſually commanded by a general officer. A ſquadron is commonly ranged into three diviſions, the commanding officer of which is always ſtationed in the centre.

When a fleet conſiſts of 60 ſail of the *line*, that is, of ſhips having at leaſt 60 cannon each, the admiral divides it into three ſquadrons, each of which has its diviſions and commanding officers. Each ſquadron has its proper colours, according to the rank of the admiral who commands it, and every diviſion its proper maſt. Thus the white flag denotes the firſt diviſion of France; the white and blue the ſecond; and the third is characteriſed by the blue. In Britain, the firſt admiral, or the admiral of the fleet, diſplays the union-flag at the main-top-maſt-head; next follows the white flag with St George's croſs; and afterwards the blue. The private ſhips carry pendants of the ſame colour with their reſpective ſquadrons, at the maſts of their particular diviſions; ſo that the laſt ſhip in the diviſion of the blue ſquadron carries a blue pendant at her *mizen-top-maſt-head.*

DIVISOR, in arithmetic. See ARITHMETIC, n° 11.

DIVORCE, a breach or diſſolution of the bond of marriage. See MARRIAGE; and LAW, N° clx. 23.

Divorce is of two kinds: the one, *a vinculo matrimonii*, which alone is properly *divorce;* the other, *a menſa & thoro*, a ſeparation from bed and board.

The woman divorced *a vinculo matrimonii*, receives all again that ſhe brought with her: the other has a ſuitable ſeparate maintenance allowed her out of her huſband's effects.

The firſt only happens thro' ſome eſſential impediment

ment, as conſanguinity or affinity within the degrees forbidden, pre-contract, impotency, adultery, &c. of which impediments the canon law allows 14, comprehended in theſe verſes:

Error, conditio, votum, cognatio, crimen,
Cultus, diſparitas, vis, ordo, ligamen, honeſtas,
Si ſis affinis, ſi forte coire nequibis,
Si parochi & duplicis deſit præſentia teſtis,
Raptave ſit mulier, nec parti reddita tutæ.

DIURESIS, from υρον, *urine*. An excretion of urine.

DIURETICS, (from δια, *by*, and υρον, *urine*), medicines which provoke a diſcharge by urine.

Celſus ſays every fragrant herb that is cultivated in a garden is diuretic. However numerous diuretic medicines may be, there are none elſe whoſe efficacy is ſo uncertain conſidered as diuretic. Honey and ſugar increaſe the virtue of diuretics; they ſhould be often uſed to be effectual, and the body ſhould be kept cool. —If a medicine is deſigned to paſs off by urine, walking gently in a cool air will aſſiſt it; but ſweating or conſiderable warmth directs it to the ſkin, or at leaſt reſtrains its efficacy. Medicines of the ſaline kind are diuretic or perſpirative, according as the body is kept cool or warm.

In adminiſtring this kind of medicines, they are rarely given with reſpect to their operation as diuretics, but with reſpect to the habit or ſtate of the patient's body, as appears from the different claſſes of medicines that come under this denomination; the chief of which remove impediments to, rather than promote the diſcharge of, urine.

The following different claſſes of medicines are uſed with a view to promote the diſcharge of urine. 1. Cordial nervous medicines. Theſe accelerate the motion of the blood when too languid, and increaſe its fluidity, and thus increaſe this diſcharge. 2. Emollient balſamics. Theſe relax and lubricate, ſo obtain a paſſage for what is too bulky. 3. Subſtances conſiſting of ſalts and mucilages. Theſe guard againſt ſtricture in the veſſels, and at the ſame time fit the matter to be diſcharged for a more eaſy excluſion. 4. Detergent balſamics. Theſe rarify and ſcour away viſcous or ſabulous matter which obſtructs the paſſages. 5. Alkaline and lixivious ſalts. Theſe keep the fluids at leaſt in a due ſtate of tenuity for being excreted. 6. Acid and nitrous ſalts. Theſe determine the ſerum to the kidneys, if not counteracted by heat. 7. Antiſpaſmodics. Theſe relieve by taking off a ſtricture in the kidneys.

DIURNAL, in aſtronomy, ſomething relating to day; in oppoſition to *nocturnal*, which regards the night.

DIVUS, DIVA, in antiquity, appellations given to men and women who had been deified, or placed in the number of the gods. See DEIFICATION, &c.

Hence it is, that on medals ſtruck for the conſecration of an emperor, or empreſs, they give them the title of *divus*, or *diva*: for example, DIVUS JULIUS. DIVO ANTONINO PIO. DIVO PIO. DIVO CLAUDIO. DIVA FAUSTINA AUG. &c.

DIZZINESS, in medicine. See VERTIGO.

DO, in muſic, a note of the Italian ſcale, correſponding to *ut* of the common gamut. See MUSIC.

DOB-CHICK, in ornithology. See COLYMBUS.

DOBSON (William), an eminent Engliſh portrait and hiſtory painter, born at London in 1610. He ſerved an apprenticeſhip with one Peck, a ſtationer and picture-dealer; and owed his improvement to the copying ſome pictures of Titian and Van Dyck, whoſe manner he always retained. He had farther obligations to the latter of theſe artiſts: for it is ſaid, that a picture of his painting being expoſed at a ſhop on Snow-hill, Van Dyck paſſing by was ſtruck with it exceedingly; and inquiring after the author, found him at work in a poor garret. Van Dyck had the generoſity to equip him in a manner ſuitable to his merit. He preſented him to king Charles I. who took him under his protection, kept him with him at Oxford all the time his majeſty continued in that city, and not only ſat to him ſeveral times for his picture, but cauſed the prince of Wales, prince Rupert, and moſt of the lords of his court, to do ſo too. Mr Dobſon, however, being ſomewhat looſe and irregular in his way of life, was far from improving the many opportunities he had of making his fortune; and died very poor in 1647, at his houſe in St Martin's lane.

DOCIMASIA, in Greek antiquity, a probation of the magiſtrates and perſons employed in public buſineſs at Athens. It was performed publicly in the forum, where they were obliged to give account of themſelves and their paſt life before certain judges. Among ſeveral queſtions propoſed to them, we find the following, Whether they had been dutiful to their parents, had ſerved in the wars, and had a competent eſtate?

DOCIMASTIC ART, a name given to the art of eſſaying by operations in ſmall, the nature and quantity of metallic or other matters which may be obtained from mineral or other compound bodies. See REFINING and METALLURGY.

DOCIMENUM MARMOR, a name given by the ancients to a ſpecies of marble of a bright and clear white, much uſed in large and ſumptuous buildings, ſuch as temples and the like. It had its name from *Docimenos*, a city of Phrygia, afterwards called Synaia; near which it was dug, and from whence it was ſent to Rome. It was accounted little inferior to the Parian in colour, but not capable of ſo elegant a poliſh; whence it was leſs uſed by the ſtatuaries, or in other ſmaller works. The emperor Adrian is ſaid to have uſed this marble in building the temple of Jupiter; and many others of the great works of the Romans are of it.

DOCK, in botany. See LAPATHUM.

DOCK, in the manege, is uſed for a large caſe of leather, as long as the dock of a horſe's tail, which ſerves it for a cover. The French call the dock *trouſſequeue*. It is made faſt by ſtraps to the crupper, and has leathern thongs that paſs between his thighs, and along his flanks to the ſaddle-ſtraps, in order to keep the tail tight, and to hinder it from whiſking about.

DOCK, in maritime affairs, a ſort of broad and deep trench, formed on the ſide of a harbour, or on the banks of a river; and commodiouſly fitted either to build ſhips, or receive them to be repaired and *breamed* therein. Theſe ſorts of docks have generally ſtrong flood-gates to prevent the flux of the tide from entering the dock while the ſhip is under repair.—There are likewiſe docks of another kind, called *wet docks*, where a ſhip can only be cleaned during the receſs of the tide, or in the interval between the time when the tide left her dry a-ground, and the period when it again reaches her by the return of the flood. Docks of the latter kind are not furniſhed with the uſual floodgates.

Dock-*Yards*, certain magazines containing all ſorts of naval ſtores and timber for ſhip-building. In England, the royal dock-yards are at Chatham, Portſmouth, Plymouth, Deptford, Woolwich, and Sheerneſs. His majeſty's ſhips and veſſels of war are generally moored at theſe ports during the time of peace; and ſuch as want repairing are taken into the docks, examined, and refitted for ſervice.

The principal dock-yards are governed by a commiſſioner, reſident at the port; who ſuperintends all the muſters of the officers, artificers, and labourers, employed in the dock-yard, and ordinary. He alſo controls their payment therein; examines the accounts; contracts, and draws bills on the navy-office to ſupply the deficiency of ſtores; and, finally, regulates whatever belongs to the dock-yard, maintaining due order in the reſpective offices.

Theſe yards are generally ſupplied from the northern crowns with hemp, pitch, tar, roſin, canvas, oak-plank, and ſeveral other ſpecies. With regard to the maſts, particularly thoſe of the largeſt ſize, they are uſually imported from New-England.

DOCTOR, a perſon who has paſſed all the degrees of a faculty, and is impowered to teach or practiſe the ſame: thus we ſay, doctor in divinity, doctor in phyſic, doctor of laws.

The title of *doctor* ſeems to have been created in the XIIth century, inſtead of *maſter;* and eſtabliſhed, with the other ſcholaſtic degrees of bachelors and licentiates, by Peter Lombard and Gilbert Porreus, then the chief divines of the univerſity of Paris. Gratian did the ſame thing, at the ſame time, in the univerſity of Bologna.

Doctor *of the Law*, a title of honour among the Jews. The inveſtiture, if we may ſo ſay, of this order was performed by putting a key and table-book in their hands; which is what ſome authors imagine our Saviour had in view, Luke xi. 52. when, ſpeaking of the doctors of the law, he ſays, "Wo unto you doctors of the law, for you have taken away the key of knowledge: you entered not in yourſelves, and them that were entering you hindered."

Doctor, is alſo an appellation adjoined to ſeveral ſpecific epithets, expreſſing the merit of ſome of the ſchoolmen: thus, Alexander Hales is called the irrefragable doctor; Thomas Aquinas, the angelic doctor; St Bonaventure, the ſeraphic doctor; John Duns Scotus, the ſubtile doctor; Raimond Lully, the illuminated doctor; Roger Bacon, the admirable doctor, &c.

Doctors-*Commons*. See College *of Civilians*.

DOCUMENT, in law, ſome written monument produced in proof of any thing aſſerted.

DODDER, in botany. See Cuscuta.

DODDRIDGE (Philip), D. D. an eminent Preſbyterian miniſter, was the ſon of Daniel Doddridge an oil-man in London, where he was born on the 26th of June 1702; and having completed the ſtudy of the claſſics in ſeveral ſchools, was, in 1719, placed under the tuition of the reverend Mr John Jennings, who kept an academy at Kilworth in Leiceſterſhire. He was firſt ſettled as a miniſter at Kilworth, where he preached to a ſmall congregation in an obſcure village: but, on Mr Jennings's death, ſucceeded to the care of his academy; and ſoon after was choſen miniſter of a large congregation of Diſſenters at Northampton, to which he removed his academy, and where the number of his pupils encreaſed. He inſtructed his pupils with the freedom and tenderneſs of a father; and never expected nor deſired that they ſhould blindly follow his ſentiments, but encouraged them to judge for themſelves. He checked any appearance of bigotry and uncharitableneſs, and endeavoured to cure them by ſhewing what might be ſaid in defence of thoſe principles they diſliked. He died at Liſbon, whither he went for the recovery of his health; and his remains were interred in the burying-ground belonging to the Britiſh factory there, and a handſome monument was erected to his memory in the meeting-houſe at Northampton, at the expence of the congregation, on which is an epitaph written by Gilbert Weſt, eſq. He wrote, 1. Free thoughts on the moſt probable means of reviving the diſſenting intereſt; 2. The life of Colonel James Gardiner; 4. Sermons on the education of children; 4. The riſe and progreſs of religion in the ſoul; 5. The Family Expoſitor, in 6 vols. 4to, &c. And ſince the author's death, a volume of his Hymns have been publiſhed, and his Theological Lectures. Several of his works have been tranſlated into Dutch, German, and French.

DODECAGON, in geometry, a regular polygon conſiſting of twelve equal ſides and angles.

DODECAHEDRON, in geometry, one of the platonic bodies, or regular ſolids, contained under twelve equal and regular pentagons.

DODECANDRIA, (from δωδεκα, *twelve*, and ανηρ, *a man*); the name of the eleventh claſs in Linnæus's ſexual ſyſtem, conſiſting of plants with hermaphrodite flowers, that, according to the title, have twelve ſtamina or male organs. This claſs, however, is not limited with reſpect to the number of ſtamina. Many genera have ſixteen, eighteen, and even nineteen ſtamina; the eſſential character ſeems to be, that, in the claſs in queſtion, the ſtamina, however numerous, are inſerted into the receptacle: whereas, in the next claſs, Icoſandria, which is as little determined in point of number as the preſent, they are attached to the inſide of the calix or flower-cup.

The orders in this claſs, which are ſix, are founded upon the number of the ſtyles, or female organs. Aſarabacca, mangoſtan, ſtorax, purple looſe-ſtrife, wild Syrian rue, and purſlane, have only one ſtyle; agrimony and heliocarpus have two; burning thorny plant, and baſtard rocket, three; *glinus*, five; *illicium*, eight; and houſe-leek, twelve.

DODO, in ornithology. See Didus.

DODONIAN, *Dodonæus*, in antiquity, an epithet given to Jupiter, becauſe he was worſhipped in a temple built in the foreſt of Dodona, where was the moſt famous and (it is ſaid) the moſt ancient oracle of all Greece. It is reported that the pigeons and the very oaks of the foreſt of Dodona ſpoke and delivered oracles. In the temple was a fountain, which the ancient naturaliſts aſſure us had a property of rekindling torches when newly extinguiſhed.

DODRANS, in antiquity, three fourths of the as. See the article As.

DODSLEY (Robert), a late eminent bookſeller, and ingenious writer, born at Mansfield in Nottinghamſhire, in the year 1703. He was not indebted to education for his literary fame, being originally a livery ſervant; but his natural genius, and early paſſion for reading, ſoon elevated him to a ſuperior ſtation. He wrote an elegant little ſatirical farce called *The Toy-ſhop*, which was acted with applauſe in 1735, and which recommended him to the patronage of Mr Pope. The following year he produced the *King and Miller of Mansfield*. The profits of theſe two farces enabled him to commence bookſeller, and his own merit procured him eminence in that profeſſion. He wrote ſome other dramatic pieces, and publiſhed a collection of his works in one vol. 8vo. under the modeſt title of *Trifles*; which was followed by *Public Virtue*, a poem in 4to. Beſide what he wrote himſelf, the public were obliged to him for exerting his judgment in the way of his buſineſs; he having collected ſeveral volumes of well choſen *Miſcellaneous Poems* and *Fugitive Pieces*, whoſe brevity would elſe have endangered their being totally loſt to poſterity. He died in 1764.

DODWELL (Henry), a very learned controverſial writer, born at Dublin, but of Engliſh extraction, in 1641. He wrote an incredible number of tracts: but his ſervices were ſo little acknowledged, that biſhop Burnet and others accuſe him of doing more hurt than good to the cauſe of Chriſtianity, by his indiſcreet love of paradoxes and novelties, and thus expoſing himſelf to the ſcoffs of unbelievers. His pamphlet on the immortality of the ſoul, gave riſe to the well known controverſy between Mr Collins and Dr Clark on that ſubject. He died in 1711.

DOESBURG, a town of the united provinces in the county of Zutphen, and province of Guelderland. It is ſmall, but well peopled, and very ſtrong, both by art and nature, having the river Yſſel on one ſide, and a moraſs on the other, and is only to be approached by a narrow neck of land. E. Long. 5. 55. N. Lat. 52. 3.

DOG, in zoology: An animal remarkable for its natural docility, fidelity, and affection for its maſter; which qualities mankind are careful to improve for their own advantage. Theſe uſeful creatures guard our houſes, gardens, and cattle, with ſpirit and vigilance. By their help we are enabled to take not only beaſts, but birds; and to purſue game both over land and through the waters. In ſome northern countries, they ſerve to draw ſleds, and are alſo employed to carry burdens. In ſeveral parts of Africa, China, and by the Weſt Indian negroes, dogs are eaten, and accounted excellent food. Nay, we have the teſtimony of Mr Forſter, that dogs fleſh, in taſte, exactly reſembles mutton*. They were alſo uſed as food by the Romans, and long before them by the Greeks, as we learn from ſeveral treatiſes of Hippocrates. In the preſent times, their ſkins, dreſſed with the hair on, are uſed in muffs, made into a kind of buſkins for perſons in the gout, and for other purpoſes. Prepared in another way, they are uſed for ladies gloves, and the linings of maſks, being thought to make the ſkin peculiarly white and ſmooth. The French import many of theſe ſkins from Scotland, under a ſmall duty. Here, when tanned, they ſerve for upper leathers for neat pumps. Dogs ſkins dreſſed are exported under a ſmall, and imported under a high, duty. The French import from Denmark large quantities of dogs hair, both white and black. The laſt is eſteemed the beſt, and is worked up in the black liſt of a particular kind of woollen cloth; but is not uſed, as many have ſuppoſed, in making of hats, being entirely unfit for this purpoſe.

With regard to the qualities of dogs, thoſe bred in the iſland of Britain are juſtly reckoned ſuperior to the dogs bred in any other country. The ſwiftneſs of the gre-hound is amazing: as are alſo the ſteadineſs and perſeverance of other hounds and beagles; the boldneſs of terriers in unearthing foxes, &c.; the ſagacity of pointers and ſetting dogs, who are taught a language by ſigns as intelligible to ſportſmen as ſpeech; and the invincible ſpirit of a bull-dog, which can be quelled only by death.—All the nations in Europe not only do juſtice to the ſuperior qualities of the Britiſh dogs, but adopt our terms and names, and thankfully receive the creatures as preſents.—It is remarkable, however, that almoſt every kind of Britiſh dogs degenerate in foreign countries; nor is it poſſible to prevent this degeneracy by any art whatever.

For the natural hiſtory of the dog, ſee Canis.

Chuſing of Dogs. In order to chuſe a dog and bitch for good whelps, take care that the bitch come of a generous kind, be well proportioned, having large ribs and flanks; and likewiſe that the dog be of a good breed and young, for a young dog and an old bitch breed excellent whelps.

Sportſma Dict.

The beſt time for hounds nitches, or bratchets, to be lined in, are the months of January, February, and March. The bitch ſhould be uſed to a kennel, that ſhe may like it after her whelping, and ſhe ought to be kept warm. Let the whelps be weaned after two months old; and though it be ſome difficulty to chuſe a whelp under the dam that will prove the beſt of the litter, yet ſome approve that which is laſt, and account him to be the beſt. Others remove the whelps from the kennel, and lay them ſeverally and apart one from the other; then they watch which of them the bitch firſt takes and carries into her kennel again, and that they ſuppoſe to be the beſt. Others again imagine that which weighs leaſt when it ſucks to be the beſt: this is certain, that the lighter whelp will prove the ſwifter. As ſoon as the bitch has littered, it is proper to chuſe them you intend to preſerve, and drown the reſt: keep the black, brown, or of one colour; for the ſpotted are not much to be eſteemed, though of hounds the ſpotted are to be valued.

Hounds for chaſe are to be choſen by their colours. The white, with black ears, and a black ſpot at the ſetting on of the tail, are the moſt principal to compoſe a kennel of, and of good ſcent and condition. The black hound, or the black tanned, or the all liver-coloured, or all white: the true talbots are the beſt for the ſtronger line; the grizzled, whether mixed or unmixed, ſo they be ſhag-haired, are the beſt verminers, and a couple of theſe are proper for a kennel.—In ſhort, take theſe marks of a good hound. That his head be of a middle proportion, rather long than round; his noſtrils wide, his ears large, his back bowed; his fillet great, his haunches large, thighs well truſſed, ham ſtrait, tail big near the reins, the reſt ſlender; the

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* See *America*, nº 52.

Dog.

Dog.
Sportſman's Dict.

the leg big; the ſole of the foot dry, and in the form of that of a fox with large claws.

Keeping Dogs *in health*.—As pointers and ſpaniels, when good of their kinds and well broken, are very valuable to a ſportſman, it is worth while to take ſome care to preſerve them in health. This very much depends on their diet and lodging: frequent cleaning their kennels, and giving them freſh ſtraw to lie on, is very neceſſary; or, in ſummer-time, deal-ſhavings, or ſand, inſtead of ſtraw, will check the breeding of fleas. If you rub your dog with chalk, and bruſh and comb him once or twice a-week, he will thrive much the better; the chalk will clear his ſkin from all greaſineſs, and he will be the leſs liable to be mangy. A dog is of a very hot nature: he ſhould therefore never be without clean water by him, that he may drink when he is thirſty. In regard to their food, carion is by no means proper for them: it muſt hurt their ſenſe of ſmelling, on which the excellence of theſe dogs greatly depends. Barley-meal, the droſs of wheat flour, or both mixed together, with broth or ſkimmed milk, is very proper food. For change, a ſmall quantity of greaves from which the tallow is preſſed by the chandlers, mixed with their flour, or ſheep's feet well baked or boiled, are a very good diet; and when you indulge them with fleſh, it ſhould always be boiled. In the ſeaſon of hunting your dogs, it is proper to feed them in the evening before, and give them nothing in the morning you intend to take them out except a little milk. If you ſtop for your own refreſhment in the day, you ſhould alſo refreſh your dogs with a little bread and milk. It has been already obſerved that dogs are of a hot conſtitution; the greateſt relief to them in the ſummer, is twitch-graſs, or dog-graſs, which is the ſame thing. You ſhould therefore plant ſome of it in a place where you can turn them into every morning: they will feed freely on it to be cured of the ſickneſs they are ſubject to, and cured of any extraordinary heat of blood: but unleſs the graſs be of this ſort, it will have no effect.

Diſeaſes of Dogs.—1. *Bites and Stings*. If dogs are bitten by any venomous creatures, as ſnakes, adders, &c. ſqueeze out the blood, and waſh the place with ſalt and urine; then lay a plaſter to it made of calamint, pounded in a mortar, with turpentine and yellow wax, till it come to a ſalve. If you give your dog ſome of the juice of calamint to drink in milk, it will be good; or an ounce of treacle diſſolved in ſome ſweet wine.

2. *Mange*. Dogs are ſubject to the mange from being fed too high, and allowed no exerciſe or an opportunity of refreſhing themſelves with dog-graſs; or by being ſtarved at home, which will cauſe them to eat the vileſt ſtuff abroad, ſuch as carrion, or even human excrement; or by want of water, and ſometimes by not being kept clean in their kennel, or by foundering and melting in their greaſe. Either of theſe will heat the blood to a great degree, which will have a tendency to make them mangy. The cure may be effected by giving ſtone-brimſtone powdered fine, either in milk or mixed up with butter, and rubbing them well every day for a week with an ointment made of ſome of the brimſtone and pork-lard, to which add a ſmall quantity of oil of turpentine.—Or, boil four ounces of quickſilver in two quarts of water to half the quantity; bathe them every day with this water, and let them have ſome of it to lick till the cure is perfected. Or, a ſmall quantity of trooper's ointment rubbed on the parts on its firſt appearance will cure it. It will alſo free louſy puppies from their lice. Or, take two ounces of euphorbium; flour of ſulphur, Flanders oil of bays, and ſoft ſoap, each four ounces. Anoint and rub your dog with it every other day; give him warm milk, and no water. The cure will be performed in about a week. The following receipt is alſo ſaid to be efficacious. Take two handfuls of wild creſſes, and as much elecampane, and alſo of the leaves and roots of roerb and ſorrel, and two pounds of the roots of fodrels: boil all theſe well together in lee and vinegar; ſtrain the decoction, and put into it two pounds of grey ſoap and when it is melted, rub the dog with it four or five days ſucceſſively, and it will cure him.

3. *Poiſon*. If you ſuſpect your dog to be poiſoned with nux vomica, (the poiſon uſually employed by the warreners, which cauſes convulſive fits and ſoon kills); the moſt effectual remedy, if immediately applied, is to give him a good deal of common ſalt; to adminiſter which, you may open his mouth, and put a ſtick acroſs to prevent his ſhutting it, whilſt you cram his throat full of ſalt, at the ſame time holding his mouth upwards; and it will diſſolve ſo that a ſufficient quantity will be ſwallowed to purge and vomit him. When his ſtomach is ſufficiently cleared by a free paſſage obtained by ſtool, give him ſome warm broth frequently, to prevent his expiring from faintneſs; and he will recover.

4. *Worms*. Dogs are very frequently troubled with worms; but more particularly whilſt they are young. Any thing bitter is ſo nauſeous to theſe worms, that they are very often voided by taking two or three purges of aloes; or (which is the ſame thing) Scots pills, four or five being a doſe for a large dog: this is to be repeated two or three times in a week. If this do not ſucceed, you may give him an ounce of powder of tin mixed up with butter, in three doſes; which ſeldom fails to cure. Or of the herb ſavin, dried and rubbed to powder, give about as much as will lie on a ſhilling for a doſe; which will entirely deſtroy worms and their ſeed.

6. *Sore Feet*. A pointer ought not to be hunted oftener than two or three days in a week: and unleſs you take care of his feet, and give him good lodging as well as proper food, he will not be able to perform that through the ſeaſon. You ſhould therefore, after a hard day's hunting, waſh his feet with warm water and ſalt; and when dry, waſh them with warm broth, or beer and butter, which will heal their ſoreneſs, and prevent a ſettled ſtiffneſs from fixing.

7. *Strains, Blows, or ſmall Wounds*. If your dog has received any little wounds by forcing thro' hedges, or gets any lameneſs from a blow or ſtrain; bathe the wound or grieved part with ſalt and cold vinegar (for warming it only evaporates the fine ſpirit); and when dry, if a wound, you may pour in it a little friar's balſam, which will perform the cure ſooner than any method hitherto experienced.

8. *Coughs and Colds*. Dogs are very ſubject to a cough, with an extraordinary choaking, which is thought to ariſe generally from a cold or ſome inward diſorder; and probably it is often occaſioned by their eating of fiſh-bones. To guard againſt it, order your ſervants

Sportſm. Dict.

to throw all ſuch fiſh-bones where the dog can't get at them. But if the diſorder be from a cold, let bleeding be repeated in ſmall quantities, if neceſſary; but if it be what is called the *diſtemper* in dogs, and they appear to be very low in ſpirits, the bleeding is better omitted. Let meat-broth, or milk-broth warmed, be the principal part of his diet, uſing at the ſame time the following medicine. Take flour of ſulphur, cold drawn linſeed oil, and ſalt-petre, of each an ounce; divide it into four doſes, giving him one doſe every other day, and let him have plenty of clean ſtraw to lie on; or one ſpoonful of honey daily.

Dog-*Madneſs*. Of this there are no leſs than ſeven ſorts common among dogs. The chief cauſes are, high-feeding, want of exerciſe, fulneſs of blood, and coſtiveneſs. As for the two firſt, you muſt obſerve when you hunt them, that they ſhould be better fed than when they reſt; and let them be neither too fat nor too lean; but, of the two, rather fat than lean; by which means they will not only be preſerved from madneſs, but alſo from the mange and ſcab: which diſeaſes they will be ſubject to for want of air, water, or exerciſe; but if you have but the knowledge to keep them in an even temper, they may live long, and continue ſound. As for water, they ſhould be left to their own pleaſure; but for exerciſe and diet, it muſt be ordered according to diſcretion, obſerving a medium. Give them once a week, eſpecially in the heat of the year, five or ſix ſpoonfuls of ſalad oil, which will cleanſe them: at other times, the quantity of a hazle-nut of mithridate is an excellent thing to prevent diſeaſes. It is alſo very good to bleed them under the tongue, and behind the ears.

The ſymptoms of madneſs are many and eaſily diſcerned. When any dog ſeparates himſelf contrary to his former uſe, becomes melancholy or droops his head, forbears eating, and as he runs ſnatches at every thing; if he often looks upwards, and his ſtern at his ſetting on be a little erect, and the reſt hanging down; if his eyes be red, his breath ſtrong, his voice hoarſe, and he drivels and foams at the mouth; you may be aſſured he has this diſtemper.

The ſeven ſorts of madneſs are as follow; of which the two firſt are incurable. 1. The hot burning madneſs. 2. The running madneſs. The animals labouring under theſe are peculiarly dangerous: for all things they bite and draw blood from, will have the ſame diſtemper; and they generally ſeize on all they meet with, but chiefly on dogs: their pain is ſo great, it ſoon kills them.—The five curable madneſſes are,

3. *Sleeping madneſs*, ſo called from the dog's great drowſineſs, and almoſt continual ſleeping. This is cauſed by the little worms that breed in the mouth of the ſtomach, from corrupt humours, vapours, and fumes which aſcend to the head: for cure of which, take ſix ounces of the juice of wormwood, two ounces of the powder of hartſhorn burnt, and two drams of agaric; mix all theſe together in a little white-wine, and give it the dog to drink in a drenching horn.

4. *Dumb madneſs*, lies alſo in the blood, and cauſes the dog not to feed, but to hold his mouth always wide open, frequently putting his feet to his mouth, as if he had a bone in his throat: to cure this, take the juice of black hellebore, the juice of *ſpatula putrida*, and of rue, of each four ounces; ſtrain them well, and put thereto two drams of unprepared ſcammony; and being mixed well together, put it down the dog's throat with a drenching horn, keeping his head up for ſome time, leſt he caſt it out again; then bleed him in the mouth, by cutting two or three veins in his gums.

It is ſaid that about eight drams of the juice of an herb called *hartſhorn*, or *dog's-tooth*, being given to the dog, cures all ſorts of madneſs.

5. *Lank madneſs*, is ſo called by reaſon of the dog's leanneſs and pining away. For cure give them a purge as before directed, and alſo bleed them: but ſome ſay there is no cure for it.

6. *Rheumatic* or *ſlavering madneſs*, occaſions the dog's head to ſwell, his eyes to look yellow, and he will be always ſlavering and driveling at the mouth. To cure which, take four ounces of the powder of the roots of polipody of the oak, ſix ounces of the juice of fennel-roots, with the like quantity of the roots of miſletoe, and four ounces of the juice of ivy: boil all theſe together in white-wine, and give it to the dog as hot as he can take it, in a drenching horn.

7. *Falling madneſs*, is ſo termed becauſe it lies in the dog's head, and makes him reel as he goes, and to fall down. For the cure, take four ounces of the juice of briony, and the ſame quantity of the juice of peony, with four drams of ſtaveſacre pulverized; mix theſe together, and give it the dog in a drenching horn; alſo let him blood in the ears, and in the two veins that come down his ſhoulders; and indeed bleeding is neceſſary for all ſorts of madneſs in dogs.

When a dog happens to be bit by a mad one, there is nothing better than their licking the place with their own tongues, if they can reach it; if not, then let it be waſhed with butter and vinegar made luke-warm, and let it afterwards be anointed with Venice turpentine; it is alſo good to piſs often on the wound; but, above all, take the juice of the ſtalks of ſtrong tobacco boiled in water, and bathe the place therewith; alſo waſh him in ſea-water, or water artificially made ſalt: give him likewiſe a little mithridate inwardly in two or three ſpoonfuls of ſack, and ſo keep him apart; and if you find him after ſome time ſtill to droop, the beſt way is to hang him.

Some have aſſerted their having cured ſeveral creatures that have been bit by mad dogs, with only giving them the middle yellow bark of buckthorn; which muſt be boiled in ale for a horſe or cow, and in milk for a dog; but that it muſt be boiled till it is as bitter as you can take it.

As to the preventive of worming dogs, see WORMING.

Dog-*Days*. See CANICULA.

Dog-*Fiſh*, in ichthyology. See SQUALUS.

Dogs-*Bane*. See APOCYNUM.

Dog-*Wood Tree*. See PISCIDIA.

DOGE, the chief magiſtrate in the republic of Venice and Genoa.—The word properly ſignifies *duke*, being formed from the Latin *dux;* as *dogate*, and *dogado*, from *ducatus*, duchy.

This dignity is elective in both Venice and Genoa. In the firſt, it continues for life; at Genoa, it is only for two years. His title is Serenity; he is chief of the council, and mouth of the republic, he being to anſwer for her. The Venetians do not go into mourning at his death, he being only the phantom of majeſty, as all the authority is veſted in the republic; the doge only lends his name to the ſenate; the power is diffuſed through the whole body; though anſwers to foreign ambaſſadors, &c. are made in the name of the doge. The money is ſtruck in his name, but does not bear his arms. All the magiſtrates riſe and ſalute him when he comes into the council: but he riſes to none but foreign ambaſſadors. He muſt not ſtir out of Venice, without leave of the counſellors, &c.

DOGGER, a Dutch fiſhing-veſſel navigated in the German ocean. It is generally employed in the herring fiſhery, being equipped with two maſts, viz. a main-maſt and a mizen-maſt, and ſomewhat reſembling a *ketch*. See the Plates at the article SHIP.

DOGGERS, in the Engliſh alum works, a name given by the workmen to a ſort of ſtone found in the ſame mines with the true alum rock, and containing ſome alum, though not near ſo much as the right kind. The county of York, which abounds greatly with the true alum-rock, affords alſo a very conſiderable quantity of theſe doggers; and, in ſome places, they approach ſo much to the nature of the true rock, that they are wrought to advantage.

DOGMA, a principle, maxim, tenet, or ſettled opinion, particularly with regard to matters of faith and philoſophy.

DOGMATICAL, ſomething belonging to a doctrine or opinion. A dogmatical philoſopher is one who aſſerts things poſitively; in oppoſition to a ſceptic, who doubts of every thing.

DOGMATISTS, a ſect of ancient phyſicians, of which Hippocrates was the firſt author. They are alſo called *logici*, logicians, from their uſing the rules of logic in ſubjects of their profeſſion. They laid down definitions and diviſions; reducing diſeaſes to certain genera, and thoſe genera to ſpecies, and furniſhing remedies for them all; ſuppoſing principles, drawing concluſions, and applying thoſe principles and concluſions to particular diſeaſes under conſideration: in which ſenſe the dogmatiſts ſtand contradiſtinguiſhed from empirics and methodiſts. They reject all medicinal virtues that they think not reducible to manifeſt qualities: but Galen hath long ago obſerved of ſuch men, that they muſt either deny plain matter of fact, or aſſign but very poor reaſons and cauſes of many effects they pretend to explain.

DOLCE (Carlo, or Carlino), a celebrated hiſtory and portrait painter, was born at Florence in 1616, and was the diſciple of Vignali. This great maſter was particularly fond of repreſenting pious ſubjects, though he ſometimes painted portraits; and his works are eaſily diſtinguiſhed by the peculiar delicacy with which he perfected all his compoſitions, by a pleaſing tint of colour, and by a judicious management of the chiaro ſcuro. His performance was remarkably ſlow: and it is reported that his brain was fatally affected by ſeeing Luca Jordano diſpatch more buſineſs in four or five hours, than he could have done in as many months. He died in 1686.

DOLE, in our ancient cuſtoms, ſignified a part or portion, moſt commonly of a meadow, where ſeveral perſons have ſhares. It alſo ſtill ſignifies a diſtribution or dealing of alms, or a liberal gift made by a great man to the people.

DOLE, in Scots law, ſignifies a malevolent intention. It is eſſential in every crime, that it be committed intentionally, or by an act of the will; hence the rule, *Crimen dolo contrahitur*.

DOLICHOS, KIDNEY-BEAN; a genus of the decandria order, belonging to the diadelphia claſs of plants. There are 25 ſpecies, the moſt remarkable of which are the following.

1. The lablab with a winding ſtalk, is a native of warm climates, where it is frequently cultivated for the table. Mr Haſſelquiſt informs us, that it is cultivated in the Egyptian gardens, but is not a native of that country. The Egyptians make pleaſant arbours with it in their houſes and gardens, by ſupporting the ſtem and leading it where they think proper. They not only ſupport it with ſticks and wood, but tie it with cords; by which means the leaves form an excellent covering, and an agreeable ſhade.

2. The ſoja is a native of Japan, where it is termed *daidſu*; and, from its excellence, *mame*; that is, "the legumen or pod," by way of eminence. It grows with an erect, ſlender, and hairy ſtalk, to our height of about four feet. The leaves are like thoſe of the garden kidney-bean *. The flowers are of a bluiſh white, and produced from the boſom of the leaves, and ſucceeded by briſtly hanging pods reſembling thoſe of the yellow lupine, which commonly contain two, ſometimes three, large white ſeeds. There is a variety of this kind, with a ſmall black fruit, which is uſed in medicine. Kempfer affirms that the ſeeds of this when pounded, and taken inwardly, give relief in the aſthma. This legumen is doubly uſeful in the Japaneſe kitchens. It ſerves for the preparation of a ſubſtance named *miſo*, that is uſed as butter; and likewiſe a pickle celebrated among them under the name of *ſooju*, or *ſoy*. To make the firſt, they take a meaſure of mame, or the beans produced by the plant: after boiling them for a conſiderable time in water, and to a proper degree of ſoftneſs, they beat or bray them into a ſoftiſh pulſe; incorporating with it, by means of repeated braying, a large quantity of common ſalt, four meaſures in ſummer, in winter three. The leſs ſalt that is added, the ſubſtance is more palatable; but what it gains in point of taſte, it loſes in durability. They then add to this mixture a certain preparation of rice, to which they give the name of *koos*; and, having formed the whole into a compoſt, remove it into a wooden veſſel which had lately contained their common ale or beverage named *ſacki*. In about two months it is fit for uſe. The koos give it a grateful taſte; and the preparing of it, like the polenta of the Germans, requires the ſkilful hand of an experienced maſter. For this reaſon there are certain people who make it their ſole buſineſs to prepare the koos, and who ſell it ready made for the purpoſe of making miſo: a ſubſtance which cannot fail to be greatly valued in thoſe countries, where butter from the milk of animals is unknown. To make ſooju, or ſoy, they take equal quantities of the ſame beans boiled to a certain degree of ſoftneſs; of muggi, that is corn, whether barley or wheat, roughly ground; and of common ſalt. Having properly mixed the beans with the pounded corn, they cover up the mixture, and keep it for a day and a night in a warm place, in order to ferment; then, putting the maſs into a pot, they cover it with the ſalt, pouring over the whole two meaſures and a half of water. This compound ſubſtance they carefully ſtir at leaſt once a-day, if twice or thrice

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* See *Phaſeolus*.

the better, for two or three months: at the end of which time, they filtrate and expreſs the maſs, preſerving the liquor in wooden veſſels. The older it is, the better and the clearer; and if made of wheat inſtead of barley, greatly blacker. The firſt liquor being removed, they again pour water upon the remaining maſs; which, after ſtirring for ſome days, as before, they expreſs a ſecond time, and thus obtain an inferior ſort of ſoy.

3. The urens, or cow-itch, is alſo a native of warm climates. It hath a fibrous root, and an herbaceous climbing ſtalk, which is naked, dividing into a great number of branches; and riſes to a great height when properly ſupported. The leaves are alternate and trilobate, riſing from the ſtem and branches about 12 inches diſtant from each other. The footſtalk is cylindrical, from 6 to 14 inches long. From the axilla of the leaf deſcends a pendulous ſolitary ſpike, from 6 to 14 inches long, covered with long blood-coloured papilionaceous flowers, riſing by threes in a double alternate manner from ſmall fleſhy protuberances, each of which is a ſhort pendunculus of three flowers. Theſe are ſucceeded by leguminous, coriaceous pods, four or five inches long, crooked like an Italic *ſ*; denſely covered with ſharp hairs, which penetrate the ſkin, and cauſe great itching. This will grow in any ſoil, in thoſe countries where it is a native: but is generally eradicated from all cultivated grounds; becauſe the hairs from the pods fly with the winds, and torment every animal they happen to touch. If it was not for this miſchievous quality, the beauty of its flowers would entitle it to a place in the beſt gardens. It flowers in the cool months, from September to March, according to the ſituation.

This plant has lately acquired a conſiderable reputation as an anthelmintic. As ſuch it is mentioned by Dr Macbride, in his "Introduction to the theory and practice of Phyſic," and by ſome other athors. From the teſtimonies of Mr Cochrane ſurgeon at Nevis, and Mr Bancroft author of a "Natural hiſtory of Guiana," we are aſſured that it is uſed in theſe countries with the greateſt ſafety and efficacy. Mr Bancroft, after mentioning the frequency of diſorders ariſing from worms in that part of the world, and aſſigning ſome reaſons for them, proceeds as follows. "But from whatever cauſe theſe worms are produced, their number is ſo great, that the uſual remedies are very inſufficient for their deſtruction; for which reaſon the planters in general have recourſe to the cow-itch for that purpoſe. From whence its uſe was firſt ſuggeſted, I am uncertain; but its efficacy is indiſputable. The part uſed is the ſetaceous hairy ſubſtance growing on the outſide of the pod, which is ſcraped off, and mixed with common ſyrup or molaſſes, to the conſiſtence of a thin electuary; of which a tea-ſpoonful to a child of two or three years old, and double the quantity to an adult, is given in the morning faſting, and repeated the two ſucceeding mornings; after which a doſe of rhubarb is uſually ſubjoined. This is the empirical practice of the planters, who uſually once in three or four months exhibit the cow-itch in this manner to their ſlaves in general, but eſpecially to all their children without diſtinction; and in this manner I have ſeen it given to hundreds, from one year old and upwards, with the moſt happy ſucceſs. The patients, after the ſecond doſe, uſually diſcharged an incredible number of worms, even to the amount of more than 20 at a time; ſo that the ſtools conſiſted of little elſe than theſe animals. But though theſe were indiſputable proofs of its efficacy, I was far from being convinced of its ſafety. I obſerved that the ſubſtance given conſiſted of an aſſemblage of ſpiculæ exquiſitely fine, and ſo acutely pointed, that, when applied to the ſkin, they excited an intolerable itching, and even inflammation; from whence I apprehended dangerous conſequences from their contact with the coats of the ſtomach and inteſtines. Indeed, when mixed with an electuary in the manner in which they are given, their elaſticity is impaired, that they do not produce the ſame ſenſible irritation: but yet I could conceive no other quality on which their efficacy depended; eſpecially after I had prepared both a tincture and decoction from the cow-itch, and given them to worm-patients without any ſenſible advantage. Influenced by theſe ſuggeſtions, I particularly examined the ſtate and condition of all ſuch patients as I knew had taken the cow-itch; and yet can with the greateſt truth declare, that, though prejudiced to its diſadvantage, I was never able, either by my own obſervation or a diligent inquiry, to diſcover a ſingle inſtance of any ill conſequence reſulting from its uſe; which has been ſo extenſive, that ſeveral thouſands muſt have taken it: and as no ill effects have been obſerved, I think not only its efficacy, but ſafety, are ſufficiently evinced, to entitle it to general uſe; eſpecially when we reflect on the uncertainty, and even danger, which attends other vermifuges. It is to be obſerved, that this remedy is particularly deſigned againſt the long round worm. Whether it is equally deleterious to the aſcarides, or whether it has ever been uſed againſt them, is uncertain.

DOLLAR, a ſilver coin current in ſeveral parts of Germany and Holland. There are various ſpecies of dollars; as the rix-dollar, the ſemi-dollar, the quarter-dollar, &c. See MONEY-*Table*.

DOLPHIN, in ichthyology. See DELPHINUS.

DOLPHIN *of the Maſt*, a peculiar kind of wreath, formed of plaited cordage, to be faſtened occaſionally round the maſts, as a ſupport to the puddening, whoſe uſe is to ſuſtain the weight of the fore and main yards, in caſe the rigging, or chains, by which thoſe yards are ſuſpended, ſhould be ſhot away in the time of battle; a circumſtance which might render their ſails uſeleſs at a ſeaſon when their aſſiſtance is extremely neceſſary. See the article PUDDENING.

DOM, or DON, a title of honour, invented and chiefly uſed by the Spaniards, ſignifying *ſir*, or *lord*.

This title, it ſeems, was firſt given to Pelayo, in the beginning of the VIIIth century. In Portugal no perſon can aſſume the title of *don*, without the permiſſion of the king, ſince it is looked upon as a mark of honour and nobility. In France it is ſometimes uſed among the religious. It is an abridgment of *domnus*, from *dominus*.

DOM *and Som*, in old charters, ſignifies full property and juriſdiction.

DOMAIN, the inheritance, eſtate, or poſſeſſion of any one. See DEMESNE.

DOMAT (John), a celebrated French lawyer born in 1625, who obſerving the confuſed ſtate of the laws, digeſted them in 4 vols 4to, under the title of "The civil laws in their natural order:" for which undertaking, Lewis XIV. ſettled on him a penſion of 2000 livres. Domat was intimate with the famous Paſcal, who left him his private papers at his death: he himſelf died in 1696.

DOME, in architecture, a ſpherical roof, or a roof of a ſpherical form, raiſed over the middle of a building, as a church, hall, pavilion, veſtibule, ſtair-caſe, &c. by way of crowning.

Dome, in chemiſtry, the upper part of furnaces, particularly portable ones. It has the figure of a hollow hemiſphere or ſmall dome. Its uſe is to form a ſpace in the upper part of the furnace, the air of which is continually expelled by the fire: hence the current of air is conſiderably increaſed, which is obliged to enter by the aſh-hole, and to paſs through the fire, to ſupply the place of the air driven from the dome. The form of this piece renders it proper to reflect or reverberate a part of the flame upon the matters which are in the furnace, which has occaſioned this kind of furnace to be called a *reverberating* one. See Furnace.

Dome, or *Doom*, ſignifies judgment, ſentence, or decree. The homagers oath in the black book of Hereford ends thus: "So help me God at his holy *dome*, and by my trowthe."

DOMENICHINO, a famous Italian painter, born of a good family at Bologna in 1581. He was at firſt a diſciple of Calvart the Fleming, but ſoon quitted his ſchool for that of the Caraccis. He always applied himſelf to his work with much ſtudy and thoughtfulneſs; and never offered to touch his pencil but when he found a proper kind of enthuſiaſm upon him. His great ſkill in architecture alſo procured him the appointment of chief architect of the apoſtolical palace from Pope Gregory XV.; nor was he without a theoretrical knowledge in muſic. He died in 1641.

DOMESDAY, or doomsday, Book, a moſt ancient record, made in the time of William I. ſurnamed the *Conqueror*, and containing a ſurvey of all the lands of England. It conſiſts of two volumes, a greater and a leſs. The firſt is a large folio, written on 382 double pages of vellum, in a ſmall but plain character; each page having a double column. Some of the capital letters and principal paſſages are touched with red ink; and ſome have ſtrokes of red ink run croſs them, as if ſcratched out. This volume contains the deſcription of 31 counties. The other volume is in quarto, written upon 450 double pages of vellum, but in a ſingle column, and in a large but very fair character. It contains the counties of Eſſex, Norfolk, Suffolk, part of the county of Rutland included in that of Northampton, and part of Lancaſhire in the counties of York and Cheſter.

This work, according to the red book in the exchequer, was begun by order of William the Conqueror, with the advice of his parliament, in the year of our Lord 1080, and completed in the year 1086. The reaſon given for taking this ſurvey, as aſſigned by ſeveral ancient records and hiſtorians, was, that every man ſhould be ſatisfied with his own right, and not uſurp with impunity what belonged to another. But, beſides this, it is ſaid by others, that now all thoſe who poſſeſſed landed eſtates became vaſſals to the king, and paid him ſo much money by way of fee or homage in proportion to the lands they held. This appears very probable, as there was at that time extant a general ſurvey of the whole kingdom, made by order of king Alfred.

For the execution of the ſurvey recorded in domeſday book, commiſſioners were ſent into every county and ſhire; and juries ſummoned in each hundred, out of all orders of freemen, from barons down to the loweſt farmers. Theſe commiſſioners were to be informed by the inhabitants, upon oath, of the name of each manor, and that of its owner; alſo by whom it was held in the time of Edward the Confeſſor; the number of hides, the quantity of wood, of paſture, and of meadow-land; how many ploughs were in the demeſne, and how many in the tenanted part of it; how many mills, how many fiſh-ponds or fiſheries belonged to it; with the value of the whole together in the time of king Edward, as well as when granted by king William, and at the time of this ſurvey; alſo whether it was capable of improvement, or of being advanced in its value: they were likewiſe directed to return the tenants of every degree, the quantity of lands then and formerly held by each of them, what was the number of villains or ſlaves, and alſo the number and kinds of their cattle and live ſtock. Theſe inquiſitions being firſt methodized in the county, were afterwards ſent up to the king's exchequer.

This ſurvey, at the time it was made, gave great offence to the people; and occaſioned a jealouſy that it was intended for ſome new impoſition. But notwithſtanding all the precaution taken by the conqueror to have this ſurvey faithfully and impartially executed, it appears from indiſputable authority, that a falſe return was given in by ſome of the commiſſioners; and that, as it is ſaid, out of a pious motive. This was particularly the caſe with the abbey of Croyland in Lincolnſhire, the poſſeſſions of which were greatly underrated both with regard to quantity and value. Perhaps more of theſe pious frauds were diſcovered, as it is ſaid Ralph Flambard, miniſter to William Rufus, propoſed the making a freſh and more rigorous inquiſition; but this was never executed.

Notwithſtanding this proof of its falſehood in ſome inſtances, which muſt throw a ſuſpicion on all others, the authority of domeſday-book was never permitted to be called in queſtion; and always, when it hath been neceſſary to diſtinguiſh whether lands were held in ancient demeſne, or in any other manner, recourſe was had to domeſday-book, and to that only, to determine the doubt. From this definitive authority, from which, as from the ſentence pronounced at *domeſday*, or the day of judgment, there could be no appeal, the name of the book is ſaid to have been derived. But Stowe aſſigns another reaſon for this appellation; namely, that domeſday-book is a corruption of *domus Dei book*; a title given it becauſe heretofore depoſited in the king's treaſury, in a place of the church of Weſtminſter or Wincheſter, called *domus Dei*. From the great care formerly taken for the preſervation of this ſurvey, we may learn the eſtimation in which its importance was held. The dialogue de Scaccariis ſays, "*Liber ille* (domeſday) *ſigilli regis comes eſt individuus in theſauro.*" Until lately it has been kept under three different locks and keys; one in the cuſtody of the treaſurer, and the others in that of the two chamberlains of the exchequer. It is now depoſited in the chapter-houſe at Weſtminminſter, where it may be conſulted on paying to the proper officers a fee of 6 *s.* 8 *d.* for a ſearch, and fourpence per line for a tranſcript.

Beſides the two volumes abovementioned, there is alſo a third made by order of the ſame king; and which differs from the others in form more than matter. There is alſo a fourth called *domeſday*, which is kept in the exchequer; which, though a very large volume, is only an abridgement of the others. In the remembrancer's office in the exchequer, is kept a fifth book, likewiſe called *domeſday*, which is the ſame with the fourth book already mentioned. King Alfred had a roll which he called *domeſday;* and the domeſday-book made by William the Conqueror referred to the time of Edward the Confeſſor, as that of king Alfred did to the time of Ethelred. The fourth book of domeſday having many pictures and gilt letters in the beginning relating to the time of king Edward the Confeſſor, this had led ſome into a falſe opinion that domeſday-book was compoſed in the reign of king Edward.

DOMESTIC, any man who acts under another, ſerving to compoſe his family; in which he lives, or is ſuppoſed to live, as a chaplain, ſecretary, &c. Sometimes domeſtic is applied to the wife and children; but very ſeldom to ſervants, ſuch as footmen, lacquies, porters, &c.

DOMICILE, in Scots law, is the dwelling-place where a perſon lives with an intention to remain.

DOMIFYING, in aſtrology, the dividing or diſtributing the heavens into 12 houſes, in order to erect a theme, or horoſcope, by means of ſix great circles, called *circles of poſition.*

There are various ways of domifying: that of Regiomontanus, which is the moſt common, makes the circles of poſition paſs thro' the interſections of the meridian and the horizon: others make them paſs through the poles of the zodiac.

DOMINANT, (from the Latin word *dominari*, to *rule* or *govern*), among muſicians, is uſed either as an adjective or a ſubſtantive; but theſe different acceptations are far from being indiſcriminate. In both ſenſes it is explained by Rouſſeau as follows.

The *dominant* or ſenſible chord is that which is practiſed upon the dominant of the tone, and which introduces a perfect cadence. Every perfect major chord becomes a *dominant* chord, as ſoon as the ſeventh minor is added to it.

Dominant, (ſubſt.) Of the three notes eſſential to the tone, it is that which is a fifth from the tonick. The tonick and the *dominant* fix the tone: in it they are each of them the fundamental ſound of a particular chord; whereas the mediant, which conſtitutes the mode, has no chord peculiar to itſelf, and only makes a part of the chord of the tonick.

M. Rameau gives the name of *dominant* in general to every note which carries a chord of the ſeventh; and diſtinguiſhes that which carries the ſenſible chord, by the name of a *tonick dominant:* but, on account of the length of the word, this addition to the name has not been adopted by artiſts: they continue ſimply to call that note a *dominant*, which is a fifth from the tonick; and they do not call the other notes which carry a chord of the ſeventh *dominants*, but *fundamentals;* which is ſufficient to render their meaning plain, and prevents confuſion.

A *dominant*, in that ſpecies of church-muſic which is called *plain-chant*, is that note which is moſt frequently repeated or beaten, in whatever degree it may be from the tonick. In this ſpecies of muſic there are *dominants* and *tonicks*, but no mediant.

DOMINATION, or DOMINION, in theology, the fourth order of angels, or bleſſed ſpirits, in the hierarchy, reckoning from the ſeraphim. See ANGEL.

DOMINGO, or ST DOMINGO, the capital of the iſland of Hiſpaniola in the Weſt Indies, is ſeated in that part belonging to the Spaniards on the ſouth ſide of the iſland, and has a commodious harbour. The town is built in the Spaniſh manner, with a great ſquare in the middle of it; about which are the cathedral, and other public buildings. From this ſquare run the principal ſtreets, in a direct line, they being croſſed by others at right angles, ſo that the form of the town is almoſt ſquare. The country on the north and eaſt ſide is pleaſant and fruitful; and there is a large navigable river on the weſt, with the ocean on the ſouth. It is the ſee of an archbiſhop, an ancient royal audience, and the ſeat of the governor. It has ſeveral fine churches and monaſteries; and is ſo well fortified, that a fleet and army ſent by Oliver Cromwel, in 1654, could not take it. The inhabitants are Spaniards, Negroes, Mulattoes, Meſtices, and Albatraces; of whom about a ſixth part may be Spaniards. It had formerly about 2000 houſes, but it is much declined of late years. The river on which it is ſeated is called *Ozama*. W. Long. 69. 30. N. Lat. 18. 25.

DOMINIC (de Guſman), founder of the Dominican order of monks, was born at Calahorra in Aragon, 1170. He preached with great fury againſt the Albigenſes, when Pope Innocent III. made a croiſade againſt that unhappy people; and was inquiſitor in Languedoc, where he founded his order, and got it confirmed by the Lateran council in 1215. He died at Bologna in 1221, and was afterwards canonized. The dominican order has produced many illuſtrious men. See DOMINICANS.

DOMINICA, one of the Caribbee iſlands in the Weſt Indies, about 39 miles long and 13 broad, ſituated between 61° and 62° W. Long. and between 15° and 16° of N. Lat. This iſland formerly belonged to the French, but was ceded to Britain by the treaty in 1763. It is very advantageous to the latter, as being ſituated between the French iſlands of Guadaloupe and Martinico, ſo that it is equally alarming to both; and its ſafe and commodious roads enable the Britiſh privateers to intercept, without riſque, the navigation of France in her colonies, whenever a war happens between the two nations.

La DOMINICA, one of the MARQUESAS Iſlands in the South Sea.

DOMINICAL LETTER, popularly called *Sunday-Letter*, one of the ſeven letters A B C D E F G, uſed in almanacks, ephemerides, &c. to denote the Sundays throughout the year. See ASTRONOMY, n° 310. The word is formed from *dominica* or *dominicus dies*, Lord's-day, Sunday.

The dominical letters were introduced into the calendar by the primitive Chriſtians, in lieu of the NUNDINAL letters in the Roman calendar.

DOMINICANS, an order of religious, called in France *Jacobins*, and in England *Black-friars* or

Preaching-friars. This order, founded by St Dominic, was approved of by Innocent III. in 1215, and confirmed by a bull of Honorius III. in 1216. The deſign of their inſtitution was to preach the goſpel, convert heretics, defend the faith, and propagate Chriſtianity. They embraced the rule of St Auguſtine, to which they added ſtatutes and conſtitutions which had formerly been obſerved either by the Carthuſians or Præmonſtratenſes. The principal articles enjoined perpetual ſilence, abſtinence from fleſh at all times, wearing of woollen, rigorous poverty, and ſeveral other auſterities. This order has ſpread into all the parts of the world. It produced a great number of martyrs, confeſſors, biſhops; and they reckon three popes, 60 cardinals, 150 archbiſhops, and 800 biſhops, of their order; beſides the maſters of the ſacred palace, who have always been Dominicans. They are inquiſitors in many places.

DOMINION, DOMINIUM, in the civil law, ſignifies the power to uſe or diſpoſe of a thing as we pleaſe.

DOMINION, or *Domination*. See DOMINATION.

DOMINIS (Mark Anthony de), archbiſhop of Spalatro in Dalmatia at the cloſe of the 15th and beginning of 16th centuries, was a man whoſe fickleneſs in religion proved his ruin. His preferment, inſtead of attaching him to the church of Rome, rendered him diſaffected to it. Becoming acquainted with our biſhop Bedell, while chaplain to Sir Henry Wotton ambaſſador from James I. at Venice, he communicated his books *de republica eccleſiaſtica* to him; which were afterwards publiſhed at London, with Bedell's corrections. He came to England with Bedell; where he was received with great reſpect, and preached and wrote againſt the Romiſh religion. He is ſaid to have had a principal hand in publiſhing father Paul's *Hiſtory of the council of Trent*, at London, which was inſcribed to James in 1619. But on the promotion of Pope Gregory XIV. who had been his ſchool-fellow and old acquaintance, he was deluded by Gondomar the Spaniſh ambaſſador into the hopes of procuring a cardinal's hat, by which he fancied he ſhould prove an inſtrument of great reformation in the church. Accordingly he returned to Rome in 1622, recanted his errors, and was at firſt well received: but he afterwards wrote letters to England, repenting his recantation; which being intercepted, he was impriſoned by Pope Urban VIII. and died in 1625. He was alſo the author of the firſt philoſophical explanation of the rainbow, which before his time was accounted a prodigy.

DOMINIUM EMINENS, in Scots law, that power which the ſtate or ſovereign has over private property, by which the proprietor may be compelled to ſell it for an adequate price where public utility requires *.

DOMINIUM *Directum*, in Scots law, the right which a ſuperior retains in his lands, notwithſtanding the feudal grant to his vaſſal. See LAW, N° clxvi. 1.

DOMINIUM *Utile*, in Scots law, the right which the vaſſal acquires in the lands by the feudal grant from his ſuperior. See LAW, N° clxvi. 1.

DOMITIAN, the Roman emperor, ſon to Veſpaſian, was the laſt of the 12 Cæſars. See (*Hiſtory of*) ROME.

DONATION, an act whereby a perſon transfers to another either the property or the uſe of ſomething as a free gift. In order to be valid, it ſuppoſes a capacity both in the donor and the donee; and requires conſent, acceptance, and delivery, and by the French alſo regiſtry.

DONATISTS, Chriſtian ſchiſmatics in Africa, who took their name from their leader Donatus. A ſecret hatred againſt Cæcilian, elected biſhop of Carthage about the year 311, excited Donatus to form this ſect. He accuſed Cæcilian of having delivered up the ſacred books to the Pagans; and pretended that his election was void, and all his adherents heretics. He taught that baptiſm adminiſtered by heretics was null, that every church but the African was become proſtituted, and that he was to be the reſtorer of religion. Some accuſe the Donatiſts of Arianiſm. Conſtantius and Honorius made laws for their baniſhment, and Theodoſius condemned them to heavy mulcts.

DONATIVE, a gratuity, or preſent made to any perſon.

Donative among the Romans was properly a gift made to the ſoldiers, as *congiarium* was that made to the people.

DONATORY, in Scots law, that perſon to whom the king beſtows his right to any forfeiture that has fallen to the crown.

DONATUS, a ſchiſmatic biſhop of Carthage, founder of the ſect of DONATISTS. His followers ſwore by him, and honoured him like a god. He died about 368.

DONATUS (Ælius), a famous grammarian, lived at Rome in 354. He was one of St Jerome's maſters; and compoſed commentaries on Terence and Virgil, which are eſteemed.

DONAWERT, a ſtrong town of Germany, in the circle of Bavaria on the frontiers of Suabia. It has been taken and retaken ſeveral times in the wars of Germany; and was formerly an imperial city, but at preſent is ſubject to the duke of Bavaria. E. Long. 10. 32. N. Lat. 48. 32.

DONAX, a genus of inſects belonging to the order of vermes teſtacea. It is an animal of the oyſter kind; and the ſhell has two valves, with a very obtuſe margin in the fore-part. There are 10 ſpecies, principally diſtinguiſhed by the figure of their ſhells *.

DONCASTER, a market-town of Yorkſhire, 30 miles ſouth of York. E. Long. 1. 0. N. Lat. 53. 30.

DONNE (Dr John), an excellent poet and divine of the 17th century. His parents were of the Romiſh religion, and uſed their utmoſt efforts to keep him firm to it; but his early examination of the controverſy between the church of Rome and the Proteſtants, at laſt determined him to chuſe the latter. He travelled into Italy and Spain; where he made many uſeful obſervations, and learned their languages to perfection. Soon after his return to England, Sir Thomas Egerton, keeper of the great ſeal, appointed him his ſecretary; in which poſt he continued five years. He marrying privately Anne the daughter of Sir George Moore then chancellor of the garter, and niece to the lord keeper's lady, was diſmiſſed from his place, and thrown into priſon. But he was reconciled to Sir George by the good offices of Sir Francis Wolley. In 1612, he accompanied Sir Robert Drury to Paris. During this time, many of the nobility ſolicited the king for ſome ſecular employment for him. But his majeſty, who took pleaſure in his converſation, had engaged him in writing

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Law, xii. 1.

* Plate LXXXVII. fig. 6.

writing his *Pſeudo Martyr*, printed at London in 1610; and was ſo highly pleaſed with that work, that in 1614 he prevailed with him to enter into holy orders; appointed him one of his chaplains, and procured him the degree of Doctor of Divinity from the univerſity of Oxford. In 1619, he attended the earl of Doncaſter in his embaſſy into Germany. In 1621, he was made dean of St Paul's: and the vicarage of St Dunſtan in the weſt, in London, ſoon after fell to him; the advowſon of it having been given to him long before by Richard earl of Dorſet. By theſe and other preferments, he was enabled to be charitable to the poor, kind to his friends, and to make good proviſion for his children. He wrote, beſides the above, 1. Devotions upon emergent occaſions. 2. The ancient hiſtory of the Septuagint, tranſlated from the Greek of Ariſteus, quarto. 3. Three volumes of ſermons, folio. 4. A conſiderable number of poems; and other works. He died in 1631; and was interred in St Paul's cathedral, where a monument was erected to his memory. His writings ſhew him to be a man of incomparable wit and learning; but his greateſt excellence was ſatire. He had a prodigious richneſs of fancy, but his thoughts were much debaſed by his verſification. He was, however, highly celebrated by all the great men of that age.

DONOR, in law, the perſon who gives lands or tenements to another in tail, &c.; as he to whom ſuch lands, &c. are given, is the *donee*.

DOOMSDAY BOOK. See DOMESDAY *Book*.

DOOR, in architecture. See ARCHITECTURE, n° 81.

DORCHESTER, the capital of Dorſetſhire, ſituated on the river Froom, ſix miles north of Weymouth: W. Long. 2. 35. N. Lat. 50. 40. It gives the title of marquis to the noble family of Pierpoint, dukes of Kingſton; and ſends two members to parliament.

DOR, the Engliſh name of the common black beetle. Some apply it alſo to the duſty beetle, that flies about hedges in the evening. See SCARABÆUS.

DOREE, or JOHN DOREE, in ichthyology. See ZEUS.

DORIA (Andrew), a gallant Genoeſe ſea-officer, born in 1466. He entered into the ſervice of Francis I. of France; but preſerved that ſpirit of independence ſo natural to a ſailor and a republican. When the French attempted to render Savona, long the object of jealouſy to Genoa, its rival in trade, Doria remonſtrated againſt the meaſure in a high tone; which bold action, repreſented by the malice of his courtiers in the moſt odious light, irritated Francis to that degree, that he ordered his admiral Barbeſieux to ſail to Genoa then in the hands of the French troops, to arreſt Doria, and to ſeize his galleys. This raſh order Doria got timely hints of; retired with all his galleys to a place of ſafety; and, while his reſentment was thus raiſed, he cloſed with the offers of the emperor Charles V. returned his commiſſion with the collar of St Michael to Francis, and hoiſted the Imperial colours. To deliver his country, weary alike of the French and Imperial yoke, from the dominion of foreigners, was now Doria's higheſt ambition; and the favourable moment offered. Genoa was afflicted with the peſtilence, the French garriſon was greatly reduced and ill-paid, and the inhabitants were ſufficiently diſpoſed to ſecond his views. He ſailed to the harbour with 13 galleys, landed 500 men, and made himſelf maſter of the gates and the palace with very little reſiſtance. The French governor with his feeble garriſon retired to the citadel, but was quickly forced to capitulate; when the people ran together, and levelled the citadel with the ground. It was now in Doria's power to have rendered himſelf the ſovereign of his country; but, with a magnanimity of which there are few examples, he aſſembled the people in the court before the palace, diſclaimed all pre-eminence, and recommended to them to ſettle that form of government they choſe to eſtabliſh. The people, animated by his ſpirit, forgot their factions, and fixed that form of government which has ſubſiſted ever ſince with little variation. This event happened in 1528. Doria lived to a great age, reſpected and beloved as a private citizen; and is ſtill celebrated in Genoa by the moſt honourable of all appellations, "The father of his country, and the reſtorer of its liberty."

DORIC, in general, any thing belonging to the Dorians, an ancient people of Greece, inhabiting near mount Parnaſſus.

DORIC *Order*. See ARCHITECTURE, n° 48.

DORIC *Dialect*, one of the five dialects or manners of ſpeaking which were principally in uſe among the ancient Greeks.—It was firſt uſed by the Lacedemonians, particularly thoſe of Argos; afterwards it paſſed into Epirus, Libya, Sicily, and the iſlands of Rhodes, Crete, &c.

DORIC *Mode*, in muſic, the firſt of the authentic modes of the ancients. Its character is to be ſevere, tempered with gravity and joy; and is proper upon religious occaſions, as alſo to be uſed in war. It begins *D*, *la*, *ſol*, *re*. Plato admires the muſic of the Doric mode, and judges it proper to preſerve good manners as being maſculine; and on this account allows it in his commonwealth. The ancients had likewiſe their ſubdoric or hypodoric mode, which was one of the plagal modes. Its character was to be very grave and ſolemn: it began with *re*, a fourth lower than the doric.

DORING, or DARING, among ſportſmen, a term uſed to expreſs a method of taking larks, by means of a clap-net and a looking-glaſs. For this ſport there muſt be provided four ſticks very ſtraight and light, about the bigneſs of a pike; two of theſe are to be four feet nine inches long, and all notched at the edges or the ends. At one end of each of theſe ſticks there is to be faſtened another of about a foot long on one ſide; and on the other ſide a ſmall wooden peg about three inches long. Then four or more ſticks are to be prepared, each of one foot length; and each of theſe muſt have a cord of nine feet long faſtened to it at the end. Every one ſhould have a buckle for the commodious faſtening on to the reſpective ſticks when the net is to be ſpread.—A cord muſt alſo be provided, which muſt have two branches. The one muſt have nine feet and a half, and the other ten feet long, with a buckle at the end of each; the reſt, or body of the cord, muſt be 24 yards long. All theſe cords, as well the long ones as thoſe about the ſticks, muſt be well twiſted and of the bigneſs of one's little finger. The next thing to be provided is a ſtaff of four feet long, pointed at one end, and with a ball of wood at the other, for the carrying theſe conveniencies in a ſack or wallet.—There ſhould alſo be carried, on this occaſion, a ſpade to level the ground where there may be any little irregularities; and two ſmall rods, each 18 inches long, and having a ſmall rod fixed with a pack-thread at the larger end of the other. To theſe are to be tied ſome pack-thread loops, which are to faſten in the legs of ſome larks; and there are to be reels to theſe, that the birds may fly a little way up and down. When all this is done, the looking-glaſs is to be prepared in the following manner. Take a piece of wood about an inch and an half thick, and cut it in form of a bow, ſo that there may be about nine inches ſpace between the two ends; and let it have its full thickneſs at the bottom, that it may receive into it a falſe piece; in the five corners of which there are to be let in five pieces of looking-glaſs. Theſe are to be fixed, that they may dart their light upwards; and the whole machine is to be ſupported on a moveable pin, with the end of a long line fixed to it, and made in the manner of the children's play-thing of an apple and a plum-ſtone; ſo that the other end of the cord being carried through a hedge, the barely pulling it may ſet the whole machine of the glaſſes a-turning. This and the other contrivances are to be placed in the middle between the two nets. The larks fixed to the place, and termed *calls*, and the glittering of the looking-glaſſes as they twirl round in the ſun, invite the other larks down; and the cord that communicates with the nets, and goes through the hedge, gives the perſon behind an opportunity of pulling up the nets, ſo as to meet over the whole, and take every thing that is between them. The places where this ſort of ſporting ſucceeds beſt are open fields remote from any trees and hedges, except one by way of ſhelter for the ſportſman: and the wind ſhould always be either in the front or back; for if it blows ſideways, it prevents the playing of the net.

DORIS, a genus of inſects, belonging to the order of vermes teſtacea. The body is oblong, flat beneath; creeping: mouth placed below; vent behind, ſurrounded with a fringe: two feelers, retractile. There are ſeveral ſpecies.—The argo, or lemon doris, has an oval body, convex, marked with numerous punctures, of a lemon colour, the vent beſet with elegant ramifications. It inhabits different parts of our ſeas, called about Brighthelmſtone the *ſea-lemon*. See Plate XCII.

DORMANT, in heraldry, is uſed for the poſture of a lion, or any other beaſt, lying along in a ſleeping attitude with the head on the fore-paws; by which it is diſtinguiſhed from the *couchant*, where tho' the beaſt is lying, yet he holds up his head.

DORMER, in architecture, ſignifies a window made in the roof of an houſe, or above the entablature, being raiſed upon the rafters.

DORMITORY, a gallery in convents or religious houſes, divided into ſeveral cells, in which the religious ſleep or lodge.

DORONICUM, LEOPARD'S *Bane*; a genus of the polygamia ſuperflua order, belonging to the ſyngeneſia claſs of plants. There are three ſpecies, of which the only one worthy of notice is the pardalianches with obtuſe heart-ſhaped leaves. It grows naturally in Hungary, and on the Helvetian mountains; but is frequently preſerved in the Engliſh gardens. It hath thick fleſhy roots, which divide into many knobs or knees, ſending out ſtrong fleſhy fibres, which penetrate deep into the ground; from theſe ariſe, in the ſpring, a cluſter of heart-ſhaped leaves, which are hairy, and ſtand upon footſtalks: between theſe ariſe the flower-ſtalks, which are channeled and hairy, near three feet high, putting out one or two ſmaller ſtalks from the ſide. Each ſtalk is terminated by one large yellow flower.—The plant multiplies very faſt by its ſpreading roots; and the ſeeds, if permitted to ſcatter, will produce plants wherever they happen to fall; ſo that it very ſoon becomes a weed in the places where it is once eſtabliſhed. It loves a moiſt ſoil, and ſhady ſituation. The roots were formerly uſed in medicine as alexipharmics and purifiers of the blood; but their operation was ſo violent, that they are now entirely laid aſide.

DORSAL, an appellation given to whatever belongs to the back. See DORSUM.

DORSET, (Thomas Sackville), Lord Buckhurſt. See SACKVILLE.

DORSET (Charles Sackville), earl of. See SACKVILLE.

DORSETSHIRE, a county of England, bounded on the ſouth by the Engliſh channel, on the north by Somerſetſhire and Wiltſhire, on the eaſt by Hampſhire, and on the weſt by Devonſhire and ſome part of Somerſetſhire. It is between 40 and 50 miles long from eaſt to weſt, and 34 broad from ſouth to north, and contains 34 hundreds, 22 market-towns, and 248 pariſhes. This county enjoys a mild, pleaſant, and wholeſome air, and a deep, rich, and fertile ſoil, finely diverſified. Towards the north it is level, under the high lands that divide it from Somerſetſhire, where there are fine arable grounds that will yield large crops of different kinds of grain. But on the ſouth, from the borders of Hampſhire by the ſea-coaſt, for an extent of almoſt 20 miles in length, and in ſome places four or five in breadth, is an heathy common, which renders this country leſs populous than it otherwiſe would be. From eaſt to weſt run a ridge of hills called the *Downs*, abounding with ſweet and ſhort herbage, which nouriſhes a vaſt number of ſheep equally eſteemed for their fleſh and fleece. The country is alſo very plentifully watered; and in all reſpects ſo well ſuited both for pleaſure and profit, that it was diſtinguiſhed by the Romans above all others. They had more ſtations and ſummer-camps in Dorſetſhire, than in any other county. That the Saxons had the ſame regard for it, is evident from the number of palaces they had in it, the ſtately minſters they built, and the expreſs directions they gave that their bodies ſhould be interred in thoſe monuments of their piety. This county yields many, and very valuable, commodities. The quarries in Purbeck and Portland ſupply ſtones of different qualities, ſuited to various uſes, and in prodigious quantities, together with ſome very rich and beautiful marble. The beſt tobacco-pipe clay in England is alſo found in this county. Madder, hemp, and flax, alſo thrive in many places, grain of all ſorts, &c.

DORSIFEROUS PLANTS, among botaniſts, ſuch as are of the capillary kind, without ſtalks, and which bear their ſeeds on the back-ſide of their leaves.

DORSTENIA, CONTRAYERVA; a genus of the monogynia order, belonging to the tetrandria claſs of plants. There are four ſpecies, all of them low herbaceous plants, growing in the warm countries of America. The root is uſed in medicine. It is full of knots; an inch or two in length, about half an inch thick; externally of a reddiſh brown colour, and pale within: long, tough, ſlender fibres ſhoot out from all ſides of it, which are generally loaded with ſmall round knots. The root has a peculiar kind of aromatic ſmell, and a ſomewhat aſtringent, warm, bitteriſh taſte, with a light and ſweetiſh kind of acrimony when chewed. The fibres have little taſte or ſmell; the tuberous part therefore ſhould only be choſen.—Contrayerva is one of the mildeſt of thoſe ſubſtances called *alexipharmics*: it is indiſputably a good and uſeful diaphoretic. Its virtues are extracted both by water and rectified ſpirit, and do not ariſe by evaporation with either.—The plants cannot be propagated in this country without the greateſt difficulty.

DORSUM, the **Back**, in anatomy, comprehends all the poſterior part of the trunk of the body from the neck to the buttocks. See **Anatomy**, nº 28, &c.

DORT, or **Dordrecht**, a city of Holland, which holds the firſt rank in the aſſembly of the ſtates. It is ſeated in a ſmall iſland formed by the rivers Meuſe, Merue, Rhine, and Linghe. The Meuſe, on which it ſtands, gives it a good harbour, and ſeparates it from the iſlands of Iſſelmonde and Ablas. It is divided from Beyerland by a canal. The harbour is very commodious for the merchandizes which come down the Rhine and the Meuſe, which keep it in a flouriſhing condition. Its ſtrength conſiſts in being ſurrounded with water. Its walls are old, and defended by round towers. It is very rich, and well built with brick, and had formerly the excluſive right of coining money. It is at preſent the ſtaple town for wines, particularly Rheniſh. It was detached from the main-land, in 1421, on the 17th of November, by a flood occaſioned by the breaking down of the dyke, which overwhelmed 70 villages, and about 100,000 perſons. However, by time and the induſtry of the inhabitants, a great part of the land is recovered. It has two principal canals, namely, the New and Old Haven, by which heavy-loaded veſſels may enter into the city. Over the Old Haven is a large bridge well built with brick.

Dort was almoſt reduced to aſhes in the year 1457; there being then conſumed 2000 houſes, with the halls, hoſpital, and church of Notre Dame: but they are now well provided with fire-engines and watchmen to prevent the like diſaſter. This city is famous for the meeting of the clergy called the Synod of Dort, in which the Calviniſts obtained a ſentence againſt the Arminians, who were called the *Remonſtrants*. The diſpute between the contending parties occaſioned ſtrange diſorders, ſkirmiſhes, and murders, in moſt of the principal cities. Thoſe miniſters who would not ſubſcribe to the decree of the ſynod were baniſhed, of whom there were above 100. E. Long. 4. 36. N. Lat. 51. 39.

DORTMUND, a rich, populous, and imperial city of Germany, in the circle of Weſtphalia. It is pretty large, but not well built. Formerly it was one of the Hanſe towns. Its territory alſo was formerly a county, and had lords of its own; but ſince 1504, it hath been poſſeſſed entirely by the city.

DORYPHORI, in antiquity, an appellation given to the lifeguardmen of the Roman emperors.

DOSE, in pharmacy, &c. the quantity of a medicine to be taken at one time. The word is formed from the Greek δοσις, which ſignifies *gift*, or a thing given; from διδωμι, *do*, "I give."

DOSITHEANS, in church-hiſtory, a ſect among the Hebrews, being one of the branches of the Samaritans. See **Samaritans**.

They abſtained from eating any creature that had life; and were ſo ſuperſtitious in keeping the ſabbath, that they remained in the ſame place and poſture wherein that day ſurpriſed them, without ſtirring till the next day. They married but once, and a great number never married. Doſitheus, their founder, being diſſatisfied among the Jews, retired to the Samaritans, who were reputed heretics, and invented another ſect; and to make it more authentic, he went into a cave, where, by too long abſtinence, he killed himſelf.—The name of *Doſitheans* was alſo given to ſome of the diſciples of Simon Magus.

DOTTEREL, in ornithology. See **Charadrius**.

DOU, or Dow, (Gerard), of Leyden, an excellent painter in the 17th century, was the diſciple of Rembrandt; but his manner of working was very different from that of his maſter. He painted little figures in oil, which he finiſhed as highly as if they had been as big as the life. He always drew after nature, and viewed his originals in a convex mirror; and, as he took a great deal of pains, his works ſeem almoſt as perfect as nature herſelf, without loſing any thing of the freſhneſs, union, or force of colouring, or of the claro oſcuro. The common height of his pictures did not exceed a foot; yet his price was ſometimes ſix hundred, ſometimes eight hundred, and ſometimes a thouſand livres each picture, according to the time he ſpent about it, though he only reckoned after the rate of a livre an hour.

DOUAY, a large and ſtrong city of the French Netherlands, ſituated in E. Long. 3. 0. N. Lat. 50. 25. It was taken by the French in 1667; by the allies in 1710; and retaken by the French in 1712.

DOUBLE; two of a ſort, one correſponding to the other.

Double *Children*, **Double** *Cats*, **Double** *Pears*, &c. Inſtances of theſe are frequent in the *Philoſoph. Tranſact.* and elſewhere. See **Monster**.

Sir John Floyer, in the ſame *Tranſactions*, giving an account of a *double turkey*, furniſhes ſome reflections on the production of *double animals* in general. Two turkeys, he relates, were taken out of an egg of the common ſize, when the reſt were well hatched, which grew together by the fleſh of the breaſt-bone, but in all other parts were diſtinct. They ſeemed leſs than the ordinary ſize, as wanting bulk, nutriment, and room for their growth; which latter, too, was apparently the occaſion of their coheſion. For, having two diſtinct cavities in their bodies, and two hearts, they muſt have ariſen from two cicatriculas; and, conſequently, the egg had two yolks; which is no uncommon accident. He mentions a dried *double chicken* in his poſſeſſion, which, though it had four legs, four wings, &c. had but one cavity in the body, one heart, and one head; and, conſequently, was produced from one cicatricula.

So, Paræus mentions a *double infant*, with only one heart: in which caſe, the original or ſtamen of the infant was one, and the veſſels regular; only, the nerves and arteries towards the extremities dividing into more branches than ordinary, produced *double* parts.

The

Double.

The ſame is the caſe in the *double flowers* of plants, occaſioned by the richneſs of the ſoil. So it is in the eggs of quadrupeds, &c.

There are, therefore, two reaſons of duplicity in embryo's: 1. The conjoining or connexion of two perfect animals; and, 2. An extraordinary diviſion and ramification of the original veſſels, nerves, arteries, &c.

DOUBLE *Employment*, in muſic, a name given by M. Rameau to the two different manners in which the chord of the ſub-dominant may be regarded and treated, *viz.* as the fundamental chord of the ſixth ſuperadded, or as the chord of the great ſixth, inverted from a fundamental chord of the ſeventh. In reality, the chords carry exactly the ſame notes, are figured in the ſame manner, are employed upon the ſame chord of the tone, in ſuch a manner, that frequently we cannot diſcern which of the two chords the author employs, but by the aſſiſtance of the ſubſequent chord, which reſolves it, and which is different in theſe different caſes.

To make this diſtinction, we muſt conſider the diatonic progreſs of the two notes which form the fifth and the ſixth, and which, conſtituting between them the interval of a ſecond, muſt one or the other conſtitute the diſſonance of the chord. Now, this progreſs is determined by the motion of the baſs. Of theſe two notes, then, if the ſuperior be the diſſonance, it will riſe by one gradation into the ſubſequent chord, the lower note will keep its place, and the higher note will be a ſuperadded ſixth. If the lower be the diſſonance, it will deſcend into the ſubſequent chord, the higher will remain in its place, and the chord will be that of the great ſixth. See the two caſes of the *double employment* in Rouſſeau's Muſical Dictionary, Plate D, fig. 12.

With reſpect to the compoſer, the uſe which he may make of the double-employment, is to conſider the chord in its different points of view, that from thence he may know how to make his entrance to it, and his exit from it; ſo that having arrived, for inſtance, at the chord of the ſuperadded ſixth, he may reſolve it as a chord of the great ſixth, and reciprocally.

M. D'Alembert has ſhewn, that one of the chief uſes of the double-employment is, that we be able to carry the diatonic ſucceſſion of the gamut even to an octave, without changing the mode, at leaſt whilſt we riſe; for in deſcending we muſt change it. Of this gammut and its fundamental baſs, an example will be found in Rouſſeau's Muſical Dictionary, Plate D, fig. 13. It is evident, according to the ſyſtem of M. Rameau, that all the harmonic ſucceſſions which reſult from it, are in the ſame tone: for, in ſtrictneſs, no other chords are there employed but three, that of the tonic, that of the dominant, and that of the ſub-dominant; as this laſt, in the double-employment, conſtitutes the ſeventh from the ſecond note, which is employed upon the ſixth.

With reſpect to what M. D'Alembert adds in his Elements of Muſic, p. 80. and which he repeats in the Encyclopédie, article *Double-emplai*, viz. that the chord of the ſeventh *re fa la ut*, though we ſhould even regard it only as an inverſion of *fa la ut re*, cannot be followed by the chord *ut mi ſol ut*; "I cannot (ſays Rouſſeau) be of his opinion in this point.

"The proof which he gives for it is, that the diſſonance *ut* of the firſt chord cannot be reſolved in the ſecond; and this is true, ſince it remains in its place: but in this chord of the ſeventh *re fa la ut*, inverted from this chord of the ſuperadded ſixth *fa la ut re*, it is not the *ut*, but the *re*, which is the diſſonance; which, of conſequence, ought to be reſolved in aſcending upon *mi*, as it really does in the ſubſequent chord; ſo that this procedure in the baſs itſelf is forced, which, from *re*, cannot without an error return to *ut*, but ought to aſcend to *mi*, in order to reſolve the diſſonance.

Double.

"M. D'Alembert afterwards ſhews, that this chord *re fa la ut*, when preceded and followed by that of the tonic, cannot be authoriſed by the double-employment: and this is likewiſe very true; becauſe this chord, tho' figured with a 7, is not treated as a chord of the ſeventh, neither when we make our entrance to it, nor our exit from it; or at leaſt that it is not neceſſary to treat it as ſuch, but ſimply as an inverſion of the ſuperadded ſixth, of which the diſſonance is the baſs: in which caſe we ought by no means to forget, that this diſſonance is never prepared. Thus, though in ſuch a tranſition the double-employment is not in queſtion, though the chord of the ſeventh be no more than apparent, and impoſſible to be reſolved by the rules, this does not hinder the tranſition from being proper and regular, as I have juſt proved to theoriſts, and as I ſhall immediately prove to practical artiſts, by an inſtance of this tranſition; which certainly will not be condemned by any one of them, nor juſtified by any other fundamental baſs except my own. (See the Muſical Dictionary, Plate D, fig. 14.)

"I acknowledge, that this inverſion of the chord of the ſixth ſuperadded, which tranſfers the diſſonance to the baſs, has been cenſured by M. Rameau. This author, taking for a fundamental chord the chord of the ſeventh, which reſults from it, rather choſe to make the fundamental baſs deſcend diatonically, and reſolve one ſeventh by another, than to unfold this ſeventh by an inverſion. I had diſſipated this error, and many others, in ſome papers which long ago had paſſed into the hands of M. D'Alembert, when he was compoſing his Elements of Muſic; ſo that it is not his ſentiment which I attack, but my own opinion which I defend."

For what remains, the double-employment cannot be uſed with too much reſerve, and the greateſt maſters are the moſt temperate in putting it in practice.

DOUBLE *Fichy*, or *Fiché*, in heraldry, the denomination of a croſs, when the extremity has two points; in contradiſtinction to fiché, where the extremity is ſharpened away to one point.

DOUBLE *Octave*, in muſic, an interval compoſed of fifteen notes in diatonic progreſſion; and which, for that reaſon, is called a *fifteenth*. "It is (ſays Rouſſeau) an interval compoſed of two octaves, called by the Greeks *diſdiapaſon*.

It deſerves however to be remarked, that in intervals leſs diſtant and compounded, as in the *third*, the *fifth*, the *ſimple octave*, &c. the loweſt and higheſt extremes are included in the number from whence the interval takes its name. But, in the *double octave*, when termed a fifteenth, the ſimple number of which it is compoſed gives the name. This is by no means analogical, and may occaſion ſome confuſion. We ſhould rather chooſe, therefore, to run any hazard which might occur from uniformly including all the terms of which the component intervals conſiſt, and call the *double* octave a ſixteenth, according to the general analogy. See INTERVAL.

DOUBLET, among lapidaries, implies a counterfeit ſtone compoſed of two pieces of cryſtal, and ſometimes glaſs ſoftened, together with proper colours between them; ſo that they make the ſame appearance to the eye, as if the whole ſubſtance of the cryſtal had been tinged with theſe colours.

The impracticability of imparting tinges to the body of cryſtals, while in their proper and natural ſtate, and the ſoftneſs of glaſs, which renders ornaments made of it greatly inferior in wear to cryſtal, gave inducements to the introduction of colouring the ſurface of cryſtal wrought in a proper form, in ſuch a manner, that the ſurfaces of two pieces ſo coloured being laid together, the effect might appear the ſame as if the whole ſubſtance of the cryſtal had been coloured. The cryſtals, and ſometimes white tranſparent glaſs ſo treated, were called *doublets*; and at one time prevailed greatly in uſe, on account of the advantages with reſpect to wear, ſuch doublets had, when made of cryſtal, over glaſs, and the brightneſs of the colours which could with certainty be given to counterfeit ſtones this way, when coloured glaſs could not be procured, or at leaſt not without a much greater expence. Doublets have not indeed the property which the others have, of bearing to be ſet tranſparent, as is frequently required in drops of ear-rings and other ornaments: but when mounted in rings, or uſed in ſuch manner that the ſides of the pieces, where the joint is made, cannot be inſpected, they have, when formed of cryſtal, the title to a preference to the coloured glaſs; and the art of managing them is therefore, in ſome degree, of the ſame importance with that of preparing glaſs for the counterfeiting gems; and is therefore properly an appendage to it, as being entirely ſubſervient to the ſame intention. The manner of making doublets is as follows:

Let the cryſtal or glaſs be firſt cut by the lapidaries in the manner of a brilliant, except that, in this caſe, the figure muſt be compoſed from two ſeparate ſtones, or parts of ſtones, formed in the manner of the upper and under parts of a brilliant, if it was divided in an horizontal direction, a little lower than the middle. After the two plates of the intended ſtone are thus cut, and fitted ſo exactly that no diviſion can appear when they are laid together, the upper part muſt be poliſhed ready for ſetting; and then the colour muſt be put betwixt the two plates by this method. "Take of Venice or Cyprus turpentine two ſcruples; and add to it one ſcruple of the grains of maſtich choſen perfectly pure, free from foulneſs, and previouſly powdered. Melt them together in a ſmall ſilver or braſs ſpoon ladle, or other veſſel, and put to them gradually any of the coloured ſubſtances below mentioned, being firſt well powdered; ſtirring them together as the colour is put in, that they may be thoroughly commixed. Warm then the doublets to the ſame degree of heat as the melted mixture; and paint the upper ſurface of the lower part, and put the upper one inſtantly upon it, preſſing them to each other, but taking care that they may be conjoined in the moſt perfectly even manner. When the cement or paint is quite cold and ſet, the redundant part of it, which has been preſſed out of the joint of the two pieces, ſhould be gently ſcraped off the ſide, till there be no appearance of any colour on the outſide of the doublets: and they ſhould then be ſkilfully ſet; obſerving to carry the mounting over the joint, that the upper piece may be well ſecured from ſeparating from the under one."

The colour of the ruby may be beſt imitated, by mixing a fourth part of carmine with ſome of the fineſt crimſon lake that can be procured.

The ſapphire may be counterfeited by very bright Pruſſian blue, mixed with a little of the abovementioned crimſon lake, to give it a caſt of the purple. The Pruſſian blue ſhould not be very deep-coloured, or but little of it ſhould be uſed: for otherwiſe, it will give a black ſhade that will be injurious to the luſtre of the doublets.

The emerald may be well counterfeited by diſtilled verdigreaſe, with a little powdered aloes. But the mixture ſhould not be ſtrongly heated, nor kept long over the fire after the verdigreaſe is added: for the colour is to be ſoon impaired by it.

The reſemblance of the garnet may be made by dragon's blood; which, if it cannot be procured of ſufficient brightneſs, may be helped by a very ſmall quantity of carmine.

The amethyſt may be imitated by the mixture of ſome Pruſſian blue with the crimſon lake; but the proportions can only be regulated by direction, as different parcels of the lake and Pruſſian blue vary extremely in the degree of ſtrength of the colour.

The yellow topazes may be counterfeited by mixing the powdered aloes with a little dragon's blood, or by good Spaniſh anotto: but the colour muſt be very ſparingly uſed, or the tinge will be too ſtrong for the appearance of that ſtone.

The chryſolite, hyacinth, vinegar garnet, eagle marine, and other ſuch weaker or more diluted colours, may be formed in the ſame manner, by leſſening the proportions of the colours, or by compounding them together correſpondently to the hue of the ſtone to be imitated; to which end it is proper to have an original ſtone, or an exact imitation of one, at hand when the mixture is made, in order to the more certain adapting the colours to the effect deſired: and when theſe precautions are taken, and the operation well conducted, it is practicable to bring the doublets to ſo near a reſemblance of the true ſtones, that even the beſt judges cannot diſtinguiſh them, when well ſet, without a peculiar manner of inſpection.

There is, however, an eaſy method of diſtinguiſhing doublets, which is only to behold them betwixt the eye and light, in ſuch poſition, that the light may paſs through the upper part and corners of the ſtone; when it will eaſily be perceived that there is no colour in the body of the ſtone.

DOUBLETS, a game on dice within tables; the men, which are only 15, being placed thus: Upon the ſice, cinque, and quatre points, there ſtand three men a-piece; and upon the trey, duce, and ace, only two. He that throws higheſt hath the benefit of throwing firſt, and what he throws he lays down, and ſo doth the other: what the one throws, and hath not, the other lays down for him, but on his own account; and thus they do till all the men are down, and then they bear. He that is down firſt, bears firſt; and will doubtleſs win the game, if the other throws not doublets to overtake him: which he is ſure to do, ſince he advances or bears as many as the doublets make, *viz.* eight for two fours.

DOUBLING, in the military art, is the putting two ranks or files of ſoldiers into one. Thus, when the word of command is, *double your ranks*, the ſecond, fourth, and ſixth ranks march into the firſt, third, and fifth, ſo that the ſix ranks are reduced to three, and the intervals between the ranks become double what they were before.

Doubling, among hunters, who ſay that a hare doubles, when ſhe keeps in plain fields, and winds about to deceive the hounds.

Doubling, in the menage, a term uſed of a horſe, who is ſaid to double his reins, when he leaps ſeveral times together, to throw his rider: thus we ſay, *the ramingue doubles his reins, and makes pontlevis.*

Doubling, in navigation, the act of ſailing round, or paſſing beyond, a cape or promontory, ſo as that the cape or point of land ſeparates the ſhip from her former ſituation, or lies between her and any diſtant obſerver.

Doubling-*Upon*, in naval tactics, the act of incloſing any part of a hoſtile fleet between two fires, or of cannonading it on both ſides.

It is uſually performed by the van or rear of that fleet which is ſuperior in number, taking the advantage of the wind, or of its ſituation and circumſtances, and tacking or veering round the van or rear of the enemy, who will thereby be expoſed to great danger, and can ſcarcely avoid being thrown into a general confuſion.

DOUBLON, or Dubloon, a Spaniſh and Portugueſe coin, being the double of a Pistole.

DOUBTING, the act of with-holding our aſſent from any propoſition, on ſuſpicion that we are not thoroughly appriſed of the merits thereof, or from not being able peremptorily to decide between the reaſons for and againſt it.

Doubting is diſtinguiſhed by the ſchoolmen into two kinds, *dubitatio ſterilis*, and *dubitatio efficax*. The former is that where no determination enſues: in this manner the Sceptics and Academics doubt, who withhold their aſſent from every thing. See Sceptics, &c.

The latter is followed by judgment, which diſtinguiſhes truth from falſehood: ſuch is the doubting of the Peripatetics and Carteſians. The laſt in particular are perpetually inculcating the deceitfulneſs of our ſenſes, and tell us that we are to doubt of every one of their reports, till they have been examined and confirmed by reaſon. On the other hand, the Epicureans teach, that our ſenſes always tell truth; and that, if you go ever ſo little from them, you come within the province of doubting. See Cartesians, Epicureans, &c.

DOUCINE, in architecture, a moulding concave above, and convex below, ſerving commonly as a cymatium to a delicate corniche. It is likewiſe called gula.

DOVE, in ornithology. See Columba.

Dove-*Tailing*, in carpentry, is the manner of faſtening boards together by letting one piece into another, in the form of the tail of a dove. The dove-tail is the ſtrongeſt of the aſſemblages or jointings; becauſe the tenon, or piece of wood which is put into the other, goes widening to the extreme, ſo that it cannot be drawn out again, by reaſon the extreme or tip is bigger than the hole.

DOVER, a borough and port town of England, in the county of Kent, ſituated in E. Long. 0. 25. N. Lat. 51. 10. It gives the title of *duke* to the dukes of Queenſbury, a branch of the noble family of Douglas; and ſends two members to parliament, ſtyled *barons of the Cinque-ports*, whereof Dover is the chief.

By the Romans this town was named *Dubris*, and by the Saxons *Doſra*, probably from the Britiſh word *Dour*, which ſignifies water. The convenience of its ſituation drew the attention of the Roman governors, who ruled here while they poſſeſſed this part of the iſland; and there ſtill remain indubitable teſtimonies of their care and reſpect for this important place. For the defence of the town, the Romans, or, according to ſome, Arviragus, a Britiſh king, their confederate, by cutting out walls with infinite labour in the ſolid rock, conſtructed a ſtony fortreſs; and, as its venerable remains ſtill prove, erected alſo a light-houſe for the benefit of navigation. The Saxons, Danes, and Normans, had a very high opinion of this place; and when the barons invited over the young prince afterwards Lewis VIII. of France, his father Philip Auguſtus conceived a bad opinion of the expedition, becauſe the caſtle and port of Dover were held for king John, though a great part of the kingdom had ſubmitted to Lewis. In its moſt flouriſhing ſtate, the fortreſs was impregnable, and the town a very opulent emporium. It had 21 wards, each of which furniſhed a ſhip for the public ſervice, 10 gates, 7 pariſh-churches, many religious houſes, hoſpitals, and other public edifices. The decay of the town was brought on by that of the harbour. To recover this, Henry VIII. ſpent no leſs than 63,000 l. in conſtructing piers, and 5000 l. in building a caſtle between this and Folkſtone, called *Sandgate;* where the ſhore was flat, and the landing eaſy. Notwithſtanding all this expence, however, it was again choaked up in the reign of Queen Elizabeth, by whom it was again cleared at a vaſt expence, ſo that ſhips of ſome hundred tons could enter it. Since that time it has again declined, notwithſtanding of many efforts for its relief, and great aſſiſtance from time to time given by parliament for this purpoſe. As the haven, however, is ſtill capable of receiving veſſels of ſmall burden, and as the packets to France and Flanders are ſtationed here in time of peace, it is ſtill a place of ſome conſequence, and the people are active and induſtrious.

DOUGLAS (lord). See (*Hiſtory of*) Scotland.

Douglas (Gavin), biſhop of Dunkeld in Scotland, was the third ſon of Archibald earl of Angus, and born in the year 1474. Where he was educated, is not known; but it is certain that he ſtudied theology: a ſtudy, however, which did not eſtrange him from the muſes; for he employed himſelf at intervals in tranſlating into beautiful verſe the poem of Ovid *de Remedio Amoris*. The advantages of foreign travel, and the converſation of the moſt learned men in France and Germany to whom his merit procured the readieſt acceſs, completed his education. With his ſuperior recommendations and worth it was impoſſible he could remain unnoticed. His firſt preferment was to be provoſt of the collegiate church of St Giles in Edinburgh; a place, at that time, of great dignity and revenue. In the year 1514, the queen mother, then regent of Scotland, appointed Douglas abbot of Aberbrothock, and ſoon after archbiſhop of St Andrews; but, the queen's power not being ſufficient to eſtabliſh him in the poſſeſſion of that dignity, he relinquiſhed his claim in favour of his competitor Foreman, who was ſupported by the pope. In 1515, he was by the queen appointed biſhop of Dunkeld; and that appointment was ſoon after confirmed by his holineſs Leo X. Nevertheleſs it was ſome time before he could obtain peaceable poſſeſſion of his ſee. The duke of Albany, who in this year was declared regent, oppoſed him becauſe he was ſupported by the queen; and, in order to deprive him of his biſhopric, accuſed him of acting contrary to law in receiving bulls from Rome. On this accuſation he was committed to the caſtle of Edinburgh, where he continued in confinement above a year; but the regent and the queen being at laſt reconciled, he obtained his liberty, and was conſecrated biſhop of Dunkeld. In 1517, he attended the duke of Albany to France; but returned ſoon after to Scotland. In 1521, the diſputes between the earls of Arran and Angus having thrown the kingdom into violent commotion, our prelate retired to England, where he became intimately acquainted with Polydore Virgil the hiſtorian. He died in London, of the plague, in 1522; and was buried in the Savoy. He wrote "The palace of Honour:" a moſt ingenious poem under the ſimilitude of a viſion; in which he paints the vanity and inconſtancy of all worldly glory. It abounds with incidents, and a very rich vein of poetry. The palace of happineſs, in the picture of Cebes, ſeems to be the ground-work of it.

"Aureæ narrationes:" A performance now loſt; in which, it is ſaid, he explained, in a moſt agreeable manner, the mythology of the poetical fictions of the ancients.

"Comœdiæ aliquot ſacræ:" None of which are now to be found.

"Thirteen bukes of Eneades, of the famoſe poet Virgil, tranſlatet out of Latin verſes into Scottiſh metre, every buke having its particular prologe. Imprinted at Lond. 1553, in 4to; and reprinted at Edinburgh 1710, in folio."

The laſt is the moſt eſteemed of all his works. He undertook it at the deſire of lord Henry Sinclair, a munificent patron of arts in thoſe times: and he completed it in 18 months; a circumſtance which his admirers are too fond of repeating to his advantage. David Hume of Godſcroft, an author of uncommon merit, and an admirable judge of poetry, gives the following teſtimony in his favour. "He wrote, (ſays he), in his native tongue, divers things; but his chiefeſt work is his tranſlation of Virgil, yet extant, in verſe: in which he ties himſelf ſo ſtrictly as is poſſible; and yet it is ſo well expreſſed, that whoſoever will eſſay to do the like, will find it a hard piece of work to go through with it. In his prologues before every book where he hath his liberty, he ſheweth a natural and ample vein of poetry, ſo pure, pleaſant, and judicious, that I believe there is none that hath written before or ſince, but cometh ſhort of him."

It has been ſaid, that he compiled an hiſtorical treatiſe "de rebus Scoticis; but no remain of it hath deſcended to the preſent times.

DOUGLAS, the principal town of the Iſle of Man, and which has lately increaſed both in trade and buildings. The harbour, for ſhips of a tolerable burden, is the ſafeſt in the iſland, and is much mended by a fine mole that has lately been built. It is ſeated on the eaſtern ſide. W. Long. 4. 25. N. Lat. 54. 7.

DOWAGER, a widow endowed, is a title applied to the widows of princes, dukes, earls, and perſons of high rank only.

Queen **DOWAGER**, is the widow of the king, and as ſuch enjoys moſt of the privileges belonging to her as queen conſort: but it is not high treaſon to violate her chaſtity or conſpire her death, becauſe the ſucceſſion is not endangered thereby; but no man can marry her without ſpecial licenſe from the king, on pain of forfeiting his lands and goods. See QUEEN.

DOWN, a county of Ireland in the province of Ulſter, bounded on the eaſt and ſouth by St George's channel; on the weſt by the county of Armagh; and on the north by the county of Antrim. It lies oppoſite to the Iſle of Man, Cumberland, and Weſtmoreland; and the north part of it fronts the Mull of Galway, in Scotland, and is about 44 miles from it. It is about 44 miles in length, and 30 in breadth. It ſends 14 members to parliament, two for the county, and 12 for the following boroughs, Down-Patrick, Newry, Newtown, Killeleagh, Bangor, and Hillſborough.

This county is rough and full of hills, and yet the air is temperate and healthy. The ſoil naturally produces wood, unleſs conſtantly kept open and ploughed; and the low grounds degenerate into bogs and moſs, where the drains are neglected. But by the induſtry of the inhabitants it produces good crops of corn, particularly oats; and, where marl is found, barley. This laſt is exported from Killogh to Dublin. The ſtaple commodity of this county is the linen manufacture.

DOWN, or *Down-Patrick*, a town of Ireland, in the county of Down, is one of the moſt ancient in that kingdom. It is a market-town and a biſhoprick, ſaid to be erected in the fifth century by St Patrick, but is now united to the ſee of Connor. Within 200 paces of the town, on the aſcent of a hill, are the ruins of an old cathedral, remarkable for the tomb of St Patrick, the founder, in which they ſay the bodies of St Bridget and St Columb are alſo laid. The town which is ſeated on the ſouth corner of Lough Coin, now called the *lake of Strangford*, is adorned with ſeveral handſome public buildings. Among the hills, and in many iſlands, are flights of ſwans and other water-fowl; and the Lough abounds with ſalmon, mullets, and other ſea-fiſh. About a mile from this town is St Patrick's Well, which many people frequent to drink at ſome ſeaſons of the year, and others to perform a penance enjoined them by the popiſh prieſts. The linen manufacture is carried on here, as it is in ſeveral places in this country. W. Long. 5. 50. N. Lat. 54. 23.

DOWNETON, or DUNKTON, a borough-town of Wiltſhire, five miles ſouth of Saliſbury. It ſends two members to parliament.

DOWNHAM, a market-town of Norfolk, 10 miles ſouth of Lynn, famous for its good butter; there being 1000, and ſometimes 2000, firkins bought here every Monday, and ſent up the river Ouſe to Cambridge, from whence it is conveyed to London in the Cambridge-waggons.

DOWNS, a famous road near Deal in Kent, where both the outward and homeward-bound ſhips frequently ly make ſome ſtay; and ſquadrons of men of war rendezvous in time of war.

It affords excellent anchorage; and is defended by the caſtles of Deal, Dover, and Sandwich.

DOWRY, the money or fortune which the wife brings her huſband in marriage: it is otherwiſe called *maritagium*, marriage-goods, and differs from dower.

DOXOLOGY, an hymn uſed in praiſe of the Almighty, diſtinguiſhed by the title of *greater* and *leſſer*.

The leſſer doxology was anciently only a ſingle ſentence, without reſponſe, running in theſe words, *Glory be to the Father, and to the Son, and to the Holy Ghoſt, world without end, Amen.* Part of the latter clauſe, *As it was in the beginning, is now, and ever ſhall be*, was inſerted ſome time after the firſt compoſition. Some read this ancient hymn, *Glory be to the Father, and to the Son with the Holy Ghoſt.* Others, *Glory be to the Father in or by the Son, and by the Holy Ghoſt.* This difference of expreſſion occaſioned no diſputes in the church, till the riſe of the Arian hereſy; but when the followers of Arius began to make uſe of the latter as a diſtinguiſhing character of their party, it was entirely laid aſide by the Catholics, and the uſe of it was enough to bring any one under ſuſpicion of heterodoxy.

The doxology was uſed at the cloſe of every ſolemn office. The weſtern church repeated it at the end of every pſalm, and the eaſtern church at the end of the laſt pſalm. Many of their prayers were alſo concluded with it, particularly the ſolemn thankſgiving or conſecration prayer at the euchariſt. It was alſo the ordinary concluſion of their ſermons.

The greater doxology, or angelic hymn, was likewiſe of great note in the ancient church. It began with theſe words, which the angels ſung at our Saviour's birth, *Glory be to God on high, &c.* It was chiefly uſed in communion ſervice, and in mens private devotions. Both the doxologies have a place in the church of England, the former being repeated after every pſalm, and the latter uſed in the communion ſervice.

DRABA, in botany; a genus of the ſiliculoſa order, belonging to the tetradynamia claſs of plants. There are ſix ſpecies; of which the only one worthy of notice is the verna, or early whitlow-graſs. It hath naked ſtalks, with leaves a little ſerrated. The bloſſoms are white, and at night the flowers hang down. It grows on old walls and dry banks. It is one of the earlieſt flowering plants we have, and is good to eat as a ſalad. Goats, ſheep, and horſes eat it; cows are not fond of it; ſwine refuſe it.

DRABLING, in angling, is a method of catching barbels. Take a ſtrong line of ſix yards; which, before you faſten it to your rod, muſt be put through a piece of lead, that if the fiſh bite, it may ſlip to and fro, and that the water may ſomething move it on the ground; bait with a lobe worm well ſecured, and ſo by its motion the barbel will be enticed into the danger without ſuſpicion. The beſt places are in running water near piles, or under wooden bridges, ſupported with oaks floated and ſlimy.

DRABS, in the ſalt-works, a kind of wooden boxes for holding the ſalt when taken out of the boiling pan; the bottoms of which are made ſhelving or inclining forwards, that the briny moiſture of the ſalt may drain off.

DRAC, an imaginary being, much dreaded by the country people in many parts of France. The dracs are ſuppoſed to be malicious, or at leaſt trickſome, demons; but, which is very rare, if one of them happens to take a fancy to a man or woman, they are ſure to be the better for it. They are ſtill ſaid to lay gold cups and rings on the ſurface over pits and rivers, as baits to draw women and children in; though their uſual dwelling is ſome old empty houſe, whence they make excurſions in human form, viſible or inviſible as beſt ſuits their purpoſe. The country-folks ſhudder at the very name of the drac. Some are poſitive that they have ſeen him; for happy indeed is that village in which there is not a houſe execrated as the lurking-place of this tremendous drac.

DRACHM, a Grecian coin, of the value of ſevenpence three farthings. Drachm is alſo a weight uſed by our phyſicians; containing juſt 60 grains three ſcruples, or the eighth part of an ounce.

DRACO, an Athenian lawgiver, prior to Solon, ſo extremely ſevere, that he puniſhed all faults, ſmall or great, with death: hence his laws were proverbially ſaid to have been written with blood. He flouriſhed 624 B. C.

DRACO, the *Dragon*, in zoology, a genus belonging to the order of amphibia reptilia. The characters of which are theſe: it has four legs, a cylindrical tail, and two membranaceous wings, radiated like the fins of a fiſh, by which he is enabled to fly, but not to any great diſtance at a time. There are two ſpecies, 1. The volans, or flying dragon, with the wings entirely diſtinct from the fore-legs; it is found in Africa and the Eaſt Indies. 2. The præpos, with the wings fixed to the fore-legs; it is a native of America. They are both harmleſs creatures, and feed upon flies, ants, and ſmall inſects.

Plate lxxxviii. fig. 5.

DRACO *Volans*, in meteorology, a fiery exhalation, frequent in marſhy and cold countries.

It is moſt common in ſummer; and though principally ſeen playing near the banks of rivers, or in boggy places, yet ſometimes mounts up to a conſiderable height in the air, to the no ſmall terror of the amazed beholders; its appearance being that of an oblong, ſometimes roundiſh, fiery body, with a long tail. It is entirely harmleſs, frequently ſticking to the hands and cloaths of people, without injuring them in the leaſt.

DRACO, in aſtronomy, a conſtellation of the northern hemiſphere. See ASTRONOMY, nº 206.

DRACOCEPHALUM, DRAGON'S HEAD; a genus of the gymnoſpermia order, belonging to the didynamia claſs of plants. There are 13 ſpecies, moſt of them herbaceous, annual, or perennial, plants, from 18 inches to three feet high, garniſhed moſtly with entire leaves, and whorled ſpikes of ſmall monopetalous and ringent flowers of a blue, white, or purple colour. They are all eaſily propagated by ſeeds, which may be ſown either in the ſpring or autumn, and after the plants are come up they will require no other culture but to be kept clear from weeds.

DRACONTIC MONTH, the time of one revolution of the moon from her aſcending node, called *caput draconis*, to her return thither.

DRACONTIUM, DRAGONS; a genus of the polyandria order, belonging to the gynandria claſs of plants. There are five ſpecies, all natives of the Indies. The only one which makes any appearance is the pertuſum, with leaves having holes, and a climbing ſtalk. This is a native of moſt of the Weſt India iſlands. It hath trailing ſtalks which put out roots at every joint, that faſten to the trunks of trees, walls, or any ſupport which is near them, and thereby riſe to the height of 25 or 30 feet. The leaves are placed alternately upon long footſtalks: they are four or five inches long, two and an half broad; and have ſeveral oblong holes in each, which at firſt ſight appear as if eaten by inſects, but they are natural to the leaves. The flowers are produced at the top of the ſtalk, which always ſwells to a much larger ſize in that part immediately under the ſtalk, than in any other: theſe are covered with an oblong ſpatha or hood of a whitiſh green colour, which opens longitudinally on one ſide, and ſhews the piſtil, which is cloſely covered with flowers of a pale yellow, inclining to white. This plant is eaſily propagated by cuttings; which if planted in pots filled with poor ſandy earth, and plunged into an hot-bed, will ſoon put out roots; but the plants are ſo tender, that they muſt be preſerved in a ſtove.

DRACUNCULI, in medicine, ſmall long worms which breed in the muſcular parts of the arms and legs, called *Guinea worms*. The common way of getting out theſe worms is by the point of a needle; and to prevent their forming there again, the uſual cuſtom is to waſh the parts with wine or vinegar, with alum, nitre, or common ſalt, or with a ſtrong lixivium of oak-aſhes, and afterwards anointing them with an ointment of the common kind uſed for ſcorbutic eruptions, with a ſmall mixture of quickſilver.

DRACUNCULUS, in botany. See Arum.

DRAGOMAN, Drogman, or *Druggerman*, a name given in the Levant to the interpreters kept by the ambaſſadors of Chriſtian nations, reſiding at the Porte, to aſſiſt them in treating of their maſter's affairs.

DRAGON, in zoology. See Draco.

Dragon's-*Blood*, a red coloured, inodorous, and inſipid reſin, inſoluble in water, but ſoluble in ſpirit of wine and in oils, to both which liquors it communicates a red colour. By fire it is fuſible, inflammable, and emits an acid vapour like gum Benzoin. A ſolution of dragon's blood in ſpirit of wine is uſed for ſtaining marble, to which it gives a red tinge, which penetrates more or leſs deeply according to the heat of the marble during the time of application. But, as it ſpreads at the ſame time that it ſinks deep, for fine deſigns the marble ſhould be cold. Mr du Fay ſays, that, by adding pitch to this ſolution, the colour may be rendered deeper.

Dragon-*Fiſh*, or *Dragonet*, in ichthyology. See Callionymus.

Dragon-*Fly*. See Libellula.

Dragons, in botany. See Dracontium.

DRAGONET, or Dragon-*Fiſh*, in ichthyology. See Callionymus.

DRAGONNE'E, in heraldry. A lion dragonée is where the upper half reſembles a lion, the other half going off like the hinder part of a dragon. The ſame may be ſaid of any other beaſt as well as a lion.

DRAGOON, in military affairs, a muſqueteer, mounted on horſeback, who ſometimes fights or marches on foot, as occaſion requires.

Menage derives the word *dragoon* from the Latin *draconarius*, which in Vegetius is uſed to ſignify *ſoldier*. But it is more probably derived from the German *tragen*, or *draghen*, which ſignifies *to carry*; as being infantry carried on horſeback.

Dragoons are divided into brigades, as the cavalry, and each regiment into troops; each troop having a captain, lieutenant, cornet, quarter-maſter, two ſerjeants, three corporals, and two drums. Some regiments have hautboys. They are very uſeful on any expedition that requires diſpatch; for they can keep pace with the cavalry, and do the duty of infantry: they encamp generally on the wings of the army, or at the paſſes leading to the camp; and ſometimes they are brought to cover the general's quarters: they march in the front and rear of the army.

DRAGS, in the ſea-language, are whatever hangs over the ſhip in the ſea, as ſhirts, coats, or the like; and boats, when towed, or whatever elſe that after this manner may hinder the ſhip's way when ſhe ſails, are called *drags*.

DRAINS, a name given, in the fen countries, to certain large cuts or ditches of 20, 30, nay ſometimes 40 foot wide, carried through the marſhy ground to ſome river or other place capable of diſcharging the water they carry out of the fen-lands.

An effectual method of drawing off the water from ſuch grounds as are hurt by ſprings oozing out upon them, (uſually diſtinguiſhed by the name of *wet* or *ſpouting* ground, or *bogs*,) has been a deſideratum in agriculture. Mr Anderſon is almoſt the only perſon who hath treated this matter ſcientifically, and his obſervations ſeem to be very rational and well founded. "Springs (ſays he) are formed in the bowels of the earth, by water percolating through the upper ſtrata where that is of a porous texture, which continues to deſcend downwards till it meets with a ſtratum of clay that intercepts it in its courſe; where, being collected in conſiderable quantities, it is forced to ſeek a paſſage through the porous ſtrata of ſand, gravel, or rock, that may be above the clay, following the courſe of theſe ſtrata till they approach the ſurface of the earth, or are interrupted by any obſtacle which occaſions the water to riſe upwards, forming ſprings, bogs, and the other phenomena of this nature; which being variouſly diverſified in different circumſtances, produce that variety of appearances in this reſpect that we often meet with.

Eſſays on Agricultur Vol. I. p. 119, &

"This being the caſe, we may naturally conclude, that an abundant ſpring need never be expected in any country that is covered to a great depth with ſand without any ſtratum of clay to force it upwards, as is the caſe in the ſandy deſerts of Arabia, and the immeaſurable plains of Libya: neither are we to expect abundant ſprings in any ſoil that conſiſts of an uniform bed of clay from the ſurface to a great depth; for, it muſt always be in ſome porous ſtratum, that the water flows in abundance; and it can be made to flow horizontally in that, only when it is ſupported by a ſtratum of clay, or other ſubſtance that is equally impermeable by water. Hence the *rationale* of that rule ſo univerſally eſtabliſhed in digging for wells, that if you begin with ſand or gravel, &c. you need ſeldom hope to find water till you come to clay; and if you begin with clay, you can hope for none in abundance, till you reach to ſand, gravel, or rock.

Drains.

“ It is neceſſary that the farmer ſhould attend to this proceſs of nature with care, as his ſucceſs in draining bogs, and every ſpecies of damp and ſpouting ground, will in a great meaſure depend upon his thorough knowledge of this,— his acuteneſs in perceiving in every caſe the variations that may be occaſioned by particular circumſtances, and his ſkill in varying the plan of his operations according to theſe. As the variety of caſes that may occur in this reſpect is very great, it would be a very tedious taſk to enumerate the whole, and deſcribe the particular method of treating each; I ſhall, therefore, content myſelf with enumerating a few particular caſes, to ſhow in what manner the principles above eſtabliſhed may be applied to practice.

late XCV.

“ Let fig. 5. repreſent a perpendicular ſection of a part of the earth, in which AB is the ſurface of the ground, beneath which are ſeveral ſtrata of porous ſubſtances which allow the water to ſink through them till it reaches the line CD, that is ſuppoſed to repreſent the upper ſurface of a ſolid bed of clay; above which lies a ſtratum of rock, ſand, or gravel. In this caſe, it is plain, that when the water reaches the bed of clay, and can ſink no farther, it muſt be there accumulated into a body; and ſeeking for itſelf a paſſage, it flows along the ſurface of the clay, among the ſand or gravel, from D towards C; till at laſt it iſſues forth, at the opening A, a ſpring of pure water.

ſſays on griculture Vol. I. p. 119, &

If the quantity of water that is accumulated between D and C is not very conſiderable, and the ſtratum of clay approaches near the ſurface; in that caſe, the whole of it will iſſue by the opening at A, and the ground will remain dry both above and below it. But, if the quantity of water is ſo great as to raiſe it to a conſiderable height in the bed of ſand or gravel, and if that ſtratum of ſand is not diſcontinued before it reaches the ſurface of the ground, the water, in this caſe, would not only iſſue at A, but would likewiſe ooze out in ſmall ſtreams thro' every part of the ground between A and *a;* forming a barren patch of wet ſandy or gravelly ground upon the ſide of a declivity, which every attentive obſerver muſt have frequently met with.

To drain a piece of ground in this ſituation is, perhaps, the moſt unprofitable taſk that a farmer can engage in; not only becauſe it is difficult to execute, but alſo becauſe the ſoil that is gained is but of very little value. However, it is lucky, that patches of this kind are ſeldom of great breadth, although they ſometimes run along the ſide of a declivity in a horizontal direction for a great length. The only effectual method of draining this kind of ground, is to open a ditch as high up as the higheſt of the ſprings at *a*, which ſhould be of ſuch a depth as not only to penetrate through the whole bed of ſand or gravel, but alſo to ſink ſo far into the bed of clay below, as to make a canal therein ſufficiently large to contain and carry off the whole of the water. Such a ditch is repreſented by the dotted lines *a e z*: but, as the expence of making a ditch of ſuch a depth as this would ſuppoſe, and of keeping it afterwards in repair, is very great, it is but in very few caſes that this mode of draining would be adviſeable; and never, unleſs where the declivity happens to be ſo ſmall, as that a great ſurface is loſt for little depth, as would have been the caſe here if the ſurface had extended in the direction of the doted line *a d*.

But, ſuppoſing that the ſtratum of clay, after approaching toward the ſurface at A, continued to keep at a little depth below ground; and that the ſoil which lay above it was of a ſandy or ſpungy nature, ſo as to allow the water to penetrate it eaſily; even ſuppoſing the quantity of water that flowed from D to C was but very inconſiderable, inſtead of riſing out at the ſpring A, it would flow forward along the ſurface of the clay among the porous earth that forms the ſoil, ſo as to keep it conſtantly drenched with water, and of conſequence render it of very little value.

Wetneſs ariſing from this cauſe, is uſually of much greater extent than the former: and, as it admits of an eaſy cure, it ought not to be one moment delayed; as a ditch of a very moderate depth opened at A, and carried through a part of the ſtratum of clay, (as repreſented by the dotted lines A *k f*), would intercept and carry off the whole of the water, and render the field as dry as could be deſired. It is, therefore, of very great conſequence to the farmer, accurately to diſtinguiſh between theſe two caſes, ſo nearly allied to each other in appearance; and, as this can be eaſieſt done by boring, every one who has much ground of this kind ought to provide himſelf with a ſet of boring-irons, which he will likewiſe find uſe for on other occaſions.

“ I might here enumerate a great variety of caſes which might be reduced to the ſame head with the foregoing: but, as any attentive reader may, after what has been ſaid, be able eaſily to diſtinguiſh theſe, I ſhall only in general obſerve, that every ſoil of a ſoft and porous texture, that lies upon a bed of hard clay, whatever its ſituation in other reſpects may be, will in ſome meaſure be ſubjected to this diſeaſe. And, if it is upon a declivity of any conſiderable length, the undermoſt parts of the field will be much damaged by it, unleſs ditches are thrown up acroſs the declivity at proper diſtances from one another, to intercept the water in its deſcent.

It may not likewiſe be improper here to obſerve, that in caſes of this nature, unleſs where the ſoil is of a very great depth, the malady will always be increaſed, by raiſing the ridges to a conſiderable height; as will appear evident by examining fig. 6. in which the line A B repreſents the ſurface of a field of this nature, and C D the ſurface of the bed of clay. Now, if this field were raiſed into high ridges, as at F F F, ſo that the furrows E E E deſcended below the ſurface of the clay, it is plain, that all the water that ſhould ſink through the middle of the ridge, would run along the ſurface of the clay, till it came to the ſides of the ridge L L L L L L, which would thus be kept continually ſoaked with water. Whereas, if the ground had been kept level, as in the part of the field from G to H, with open furrows H, at moderate diſtances from each other, the water would immediately ſink to the clay, and be carried off by the furrows, ſo as to damage the ſoil far leſs than when the ridges are high. If the ſoil is ſo thin as that the plough can always touch the clay, the ridges ought to be made narrow and quite flat, as from G to H: but, if there is a little greater depth of ſoil, then it ought to be raiſed into ridges of a moderate height, as from H to K, ſo as to allow the bottom of the furrow to reach the clay: but neither is this neceſſary where the ſoil is of any conſiderable depth.

" I have ſeen ſome induſtrious farmers who, having ground in this ſituation, have been at the very great expence of making a covered drain in each furrow. But, had they rightly underſtood the nature of the diſeaſe, they never would have thought of applying ſuch a remedy; as muſt appear evident at firſt ſight to thoſe who examine the figure. The ſucceſs was what might be expected from ſuch a fooliſh undertaking.

" Theſe obſervations, it is hoped, will be ſufficient as to the manner of treating wet, ſandy, or porous ſoils. I now proceed to take notice of ſuch as are of a ſtiff clayey nature, which are often very different in appearance, and require a different treatment from theſe.

Plate XCV.

" Suppoſe that (in fig. 7.) the ſtratum of ſand or gravel D C ſhould be diſcontinued, as at E, and that the ſtratum above it ſhould be of a coherent clayey nature. In this caſe, the water that flowed towards E, being there pent in on every ſide, and being accumulated there in great quantities, it muſt at length force a paſſage for itſelf in ſome way; and preſſing ſtrongly upon the upper ſurface, if any one part is weaker than the reſt, it there would burſt forth and form a ſpring, (as ſuppoſe at A). But if the texture of every part of this ſtratum were equally ſtrong, the water would ſqueeze thro' many ſmall crannies, and would ooze out in numberleſs places, as between A and F, ſo as to occaſion that kind of wetneſs that is known by the name of a *ſpouting clayey ſoil.*

" The cure, in this caſe, is much more eaſily effected than in any of the former; for, if a ditch of a conſiderable ſize is opened, as at A, towards the lowermoſt ſide of the ſpouting ground, ſo deep as to penetrate through the upper ſtratum of clay, and reach to the gravel, the water will riſe up through it at firſt with very great violence, which will gradually decreaſe as the preſſure from the water behind is diminiſhed; and when the whole of the water, accumulated in this ſubterraneous reſervoir, is run off, there being no longer any preſſure upon the clay above it, the whole ſoon becomes as dry as could be deſired, and continues ſo ever afterwards, if the ditch is always kept open. This I ſpeak from experience, I having rendered ſome fields of this kind that were very wet, quite dry by this method of treating them.

" It will hardly be neceſſary for me here to put the farmer upon his guard, to be particularly careful in his obſervations, that he may diſtinguiſh between the wetneſs that is produced from this cauſe, and that which proceeds from the cauſe before-mentioned; becauſe the treatment that would cure the one, would be of no uſe at all to the other. The attentive obſerver likewiſe will readily perceive, that if any field that is wet from this cauſe admits of being ploughed, it will be in equal danger of being hurt by being raiſed into high ridges, with the other kind of damp ground before-mentioned. For, as the depth of earth above the reſervoir would be ſmaller in the deep furrows than any where elſe, there would, of conſequence, be leſs reſiſtance to the water in that place, ſo that it would ariſe there in greater abundance. And if, in this caſe, a farmer ſhould dig a drain in each furrow, as a conſiderable quantity of water would riſe into them, in ſome caſes, the ground might be improved, or even quite drained thereby, eſpecially if they ſhould have accidentally reached the gravel in any one place; altho' at an expence much greater than was neceſſary. I take notice of this circumſtance in ſome meaſure to prevent the prejudice that ſome inattentive obſervers might entertain againſt what was ſaid before of this method of draining, from their having accidentally ſeen ſome fields that may have been bettered by it.

" Bogs are only a variety of this laſt-mentioned kind of wet ground; and, therefore, ought in general to be drained after the ſame manner with them. Clay is a ſubſtance that ſtrongly reſiſts the entrance of water into it: but when it is long drenched with it, it is, in proceſs of time, in ſome meaſure diſſolved thereby; loſes its original firmneſs of texture and conſiſtence; and becomes a ſort of ſemi-fluid maſs, which is called a *bog;* and as theſe are ſometimes covered with a ſtrong ſcurf of a particular kind of graſs, with very matted roots, which is ſtrong enough to bear a ſmall weight without breaking, although it yields very much, it is in theſe circumſtances called a *ſwaggle*. But, whatever be the nature of the bog, it is invariably occaſioned by water being forced up through a bed of clay, as juſt now deſcribed, and diſſolving or ſoftening, if you will, a part thereof. I ſay only a part; becauſe whatever may be the depth of the bog or ſwaggle, it generally has a partition of ſolid clay between it and the reſervoir of water under it, from whence it originally proceeds: for, if this were not the caſe, and the quantity of water were conſiderable, it would meet with no ſufficient reſiſtance from the bog, and would iſſue thro' it with violence, and carry the whole ſemi-fluid maſs along with it. But, this would more inevitably be the caſe, if there was a cruſt at the bottom of the bog, and if that cruſt ſhould ever be broken, eſpecially if the quantity of water under it were very conſiderable: and as it is probable, that, in many caſes of this ſort, the water ſlowly diſſolves more and more of this under-cruſt, I make no doubt, but that, in the revolution of many ages, a great many eruptions of this kind may have happened, although they may not have been deemed of importance enough to have the hiſtory of them tranſmitted to poſterity. Of this kind, although formed of a different ſubſtance, I conſider the flow of the Solway-moſs in Northumberland to have been; which, upon the 16th of November 1771, burſt its former boundaries, and poured forth a prodigious ſtream of ſemi-fluid matter, which in a ſhort time covered ſeveral hundred acres of very fine arable ground. Nor will any one, who is acquainted with the nature of moſs,—who knows its reſemblance to clay in its quality of abſorbing and retaining water, and its very eaſy diffuſibility therein, be ſurpriſed at this; as, from all theſe properties, it is much better adapted for forming an extenſive bog, and therefore in greater danger of producing an extenſive devaſtation by an eruption of the water into it, than thoſe that are formed of any kind of clay whatever.

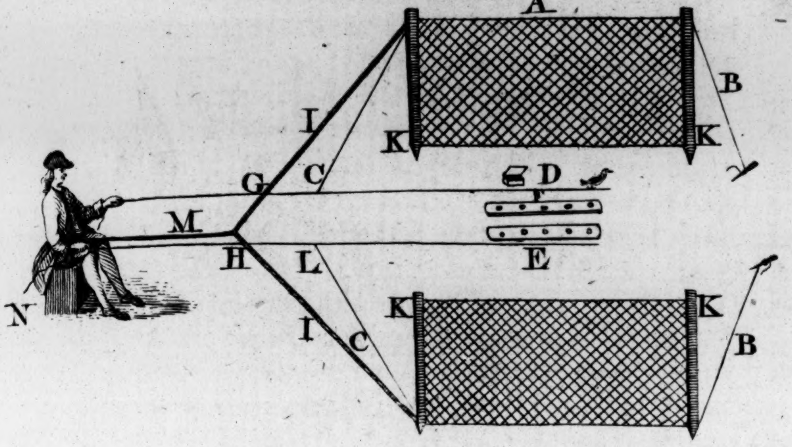
If the bog, or ſwampy ground, is upon a declivity, the ditch ought to be carried acroſs the field about the place where the loweſt ſprings ariſe. But, if the ſurface of the ground is level or nearly ſo, as between A and B, and the ſprings break out in ſeveral places, *q q q q q q*, ſo as to form ſoft quagmires interſperſed through

Fig. 8.

Plate XCV.

Fig. 1.

DAY NET.


A
B
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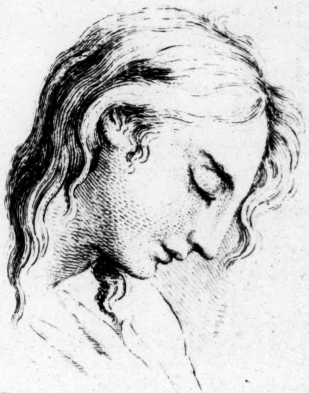
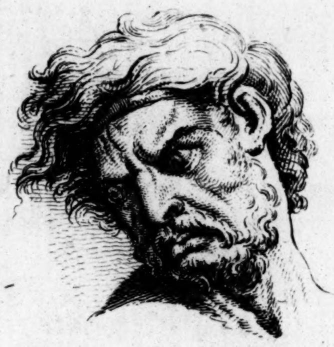
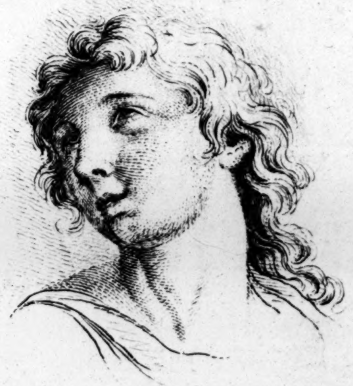
DRAWING.



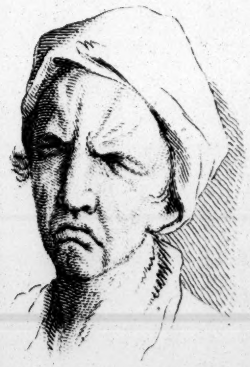
Veneration.



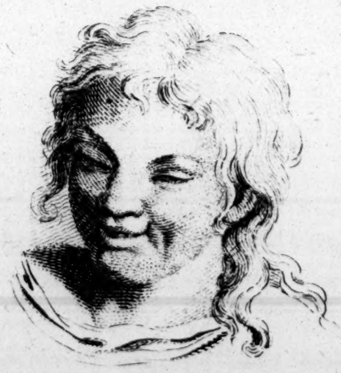
Anger.



Rapture.



Weeping



Laughter.

DRAINS.

Fig. 5.

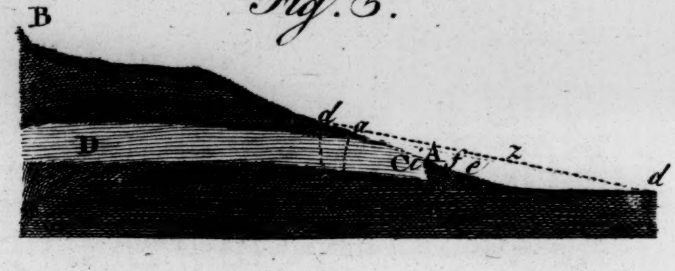


Fig. 7.

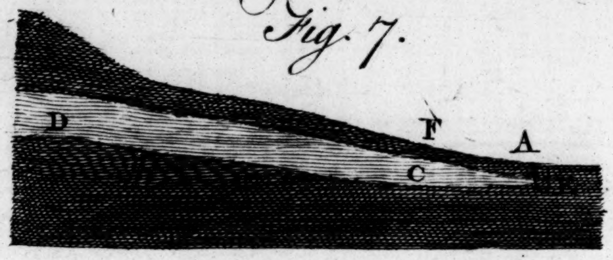


Fig. 8.

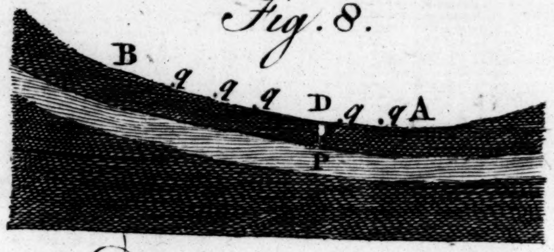


Fig. 9.

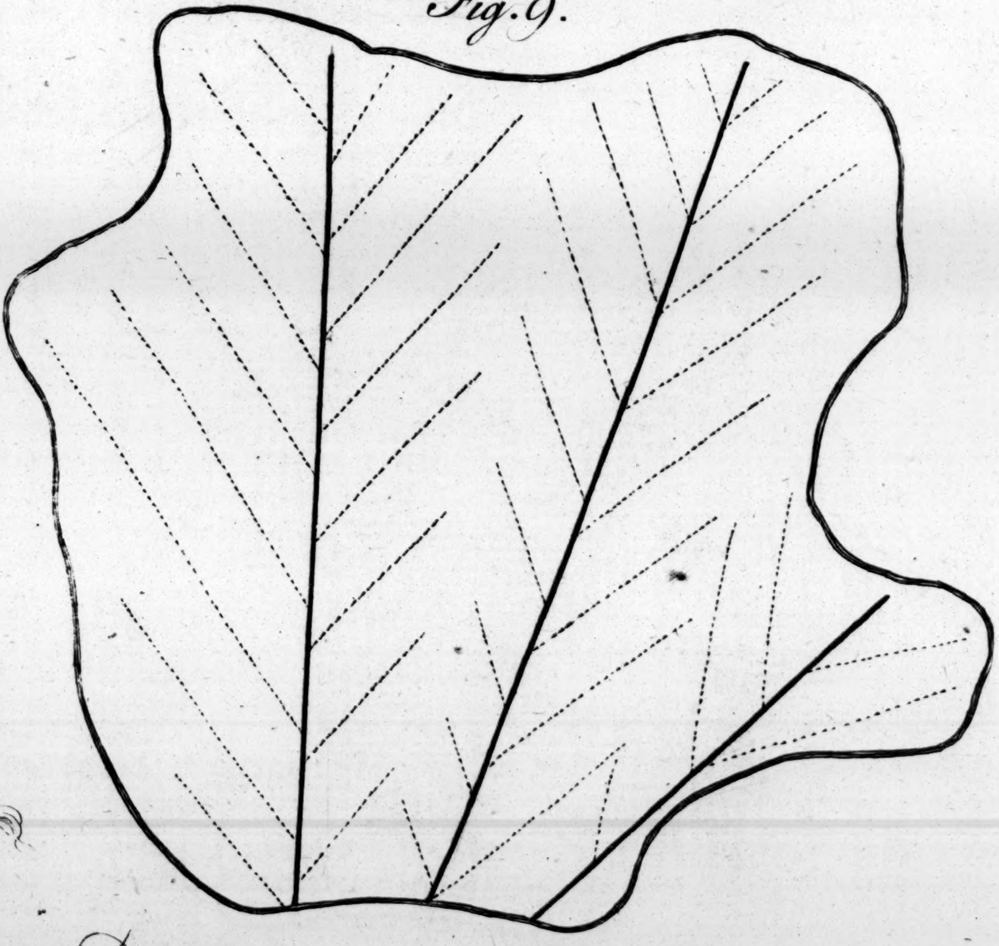
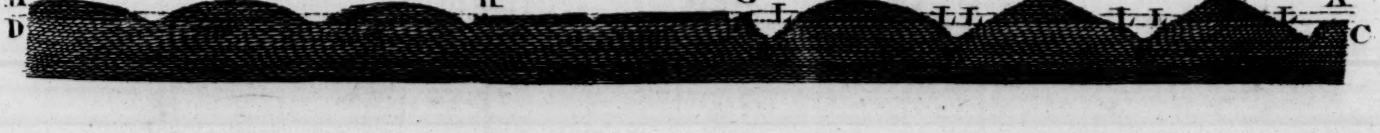


Fig. 6.


B
D
H
G
I
F
L L
F
L L
F
L
A
C

A Bell Sculp^t.

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through the whole of the field, it will be of little conſequence in what part the drain is opened; for, if it is dug up ſo deep as to allow the water to riſe in it with freedom, it will iſſue thro' that opening, and the field will be left perfectly dry.

“ But, as it may frequently happen that the ſtratum of gravel ſhall be at a conſiderable depth beneath the ſurface of the earth, and as it may be ſometimes even below the level of the place into which the drain muſt be emptied, it might ſometimes be extremely difficult to make a ditch ſo deep as to reach the bed of ſand or gravel. But, it is lucky for us, that this is not abſolutely neceſſary in the preſent caſe; as a drain of two or three feet deep, as at D, will be equally effectual with one that ſhould go to the gravel. All that is neceſſary in this caſe, is to ſink pits (P) in the courſe of the drain, at a moderate diſtance from one another, which go ſo deep as to reach the gravel: for, as the water there meets with no reſiſtance, it readily flows out at theſe openings, and is carried off by the drain without being forced up through the earth; ſo that the ground is left entirely dry ever after.

“ I have likewiſe drained ſeveral fields in this way; and as I have generally found the appearances pretty much alike, I ſhall, for the information of the inexperienced reader, give a ſhort account of them.

“ If you attempt to make your pit in one of theſe ſoft quaggy places where the water is found in great abundance, you will meet with very great difficulty in forming it; for, as the ſubſtance of which it is compoſed is ſoft, it will always flow into the hole as faſt as you dig it; on which account I would adviſe, not to attempt to make the pit in the ſwaggle, but as near it in the ſolid earth as you conveniently can. However, if it is pretty firm, and of no great extent, it is ſometimes practicable to make a pit in the ſoft bog at the drieſt time of the year. This I have ſometimes practiſed, which gave me an opportunity of obſerving the nature of theſe bogs more perfectly than I otherwiſe would have had. In the trials of this kind that I have made, this ſoft quaggy ground has ſeldom been above three or four feet deep, below which I have always found a ſtratum of hard tough clay uſually mixed with ſtones; and ſo firm, that nothing but a mattock or pick-axe could penetrate it: and, as this is comparatively ſo much drier than the ground above it, an inexperienced operator is very apt to imagine that this is the bottom that he is in ſearch of. In digging thro' this ſtratum, you will frequently meet with ſmall ſprings oozing out in all directions; ſome of them that might fill the tube of a ſmall quill, and others ſo ſmall as to be ſcarce perceptible: but without regarding theſe, you muſt continue to dig on without intermiſſion till you come to the main body of the reſervoir, if I may ſo call it, that is contained in the rock, gravel, or ſand; which you will generally find from two to four feet below the bottom of the ſwaggle, and which you will be in no danger of miſtaking when you come to it: for, if there has been no opening made before that in the field, as ſoon as you break the cruſt immediately above the gravel or rock, the water burſts forth like a torrent, and on ſome occaſions riſes like a *jet d'eau*, to a conſiderable height above the bottom of the ditch; and continues to flow off with great impetuoſity for ſome time, till the pent-up water being drained off, the violent boiling up begins to ſubſide, and the ſtrength of the current to abate; and, in a ſhort time, it flows gently out like any ordinary ſpring:—allowing it to remain in this ſtate, the quaggy earth begins to ſubſide, and gradually becomes firmer and firmer every day; ſo that, in the ſpace of a few months, thoſe bogs which were formerly ſo ſoft as hardly to ſupport the weight of a ſmall dog, become ſo firm, that oxen and horſes may tread upon them without any danger of ſinking, at the very wetteſt ſeaſon of the year. I have had a field of this nature, that, by having only one ſuch pit as I have now deſcribed opened in it, was entirely drained to the diſtance of above a hundred yards around it in every direction. But, as it is poſſible that the ſtratum in which the water runs may be in ſome places interrupted, it will be in general expedient to make ſeveral of theſe pits, if the field is of great extent; always carrying the drain forward thro' the lowermoſt part of the field, or as near the quag as you conveniently can; and ſinking a pit wherever you may judge it will be moſt neceſſary. But, if the ſtratum of gravel is not interrupted, there will be no violent burſt of water at opening any of theſe after the firſt, as I have frequently experienced. To keep theſe wells from cloſing up after they are made, it is always expedient to fill them up with ſmall ſtones immediately after they are made, which ought to riſe to the height of the bottom of the drain.

“ I have often imagined that the expence of digging theſe pits might be ſaved by boring a hole through this ſolid ſtratum of clay with a large wimble made on purpoſe; but, as I never experienced this, I cannot ſay whether or not it would anſwer the deſired end exactly.

“ If the whole field that is to be drained conſiſts of one extenſive bog, it will require a long time before the whole work can be entirely finiſhed, as it will be impoſſible to open a drain through it till one part of it is firſt drained and becomes ſolid ground. In a ſituation of this kind, the undertaker, after having opened a drain to convey the water from the loweſt part of the bog, muſt approach as near to the ſwampy ground as he can, and there make his firſt pit; which will drain off the water from the neareſt parts of the bog. When this has continued open for ſome time, and that part of the bog is become ſo ſolid as to admit of being worked, let him continue the ditch as far forward thro' it as the ſituation it is in will admit of, and there ſink another pit: and proceed gradually forward in the ſame manner; making croſs cuts where neceſſary, till the whole be finiſhed.

“ In this manner may any bog, or track of ſpouting ground of this nature, be rendered dry at a very inconſiderable expence; and as there can be no other method of draining ground of this ſort effectually, I recommend the ſtudy of it to the attention of every diligent farmer who may have occaſion for it. Let him firſt be extremely cautious in examining all the circumſtances of his particular fields, that he may be certain which of the claſſes above enumerated it may be ranked with; and, when he is perfectly ſure of that, he may proceed without fear, being morally certain of ſucceſs.

“ There is, however, one kind of damp ground not yet particularly ſpecified, that I have purpoſely omitted taking notice of till this time, as I have never had any opportunity of examining particularly into the nature of it, nor of aſcertaining by experience what is the moſt proper method of treating it.—The ſoil I have now particularly in my eye conſiſts of a deep ſtrong clay that does not vary its nature even on the ſurface, but in as far as manures may have rendered it more friable and tender: the colour uſually inclines to a reddiſh caſt, and, for the moſt part, it is ſituated upon the ſide of ſome declivity. This bed of clay reaches to a great depth, without any variation, and is intermixed with a conſiderable quantity of ſmall round ſtones. Many ſoils of the ſort now deſcribed, are apt to be continually moiſt and full of water during the winter ſeaſon; but when the dry weather of ſummer ſets in, the moiſture is diminiſhed, and the ſurface becomes hard, and it is rent into many large gaps which allow free admiſſion to the ſun and air, ſo as to ſcorch up almoſt every plant that is ſowed upon it: and as theſe ſoils are uſually in themſelves naturally fertile when drained, it were to be wiſhed that ſome method could be diſcovered that would be leſs expenſive than what is uſually practiſed with regard to ſome ſoils of this kind in Eſſex; where they make covered drains of two and a half feet deep, running diagonally through the whole field, at the diſtance of 20 feet from each other."

Concerning the making of theſe drains we have the following directions in the Georgical Eſſays, by T. B. Bayley, Eſq; of Hope near Mancheſter.—"Firſt make the main drains down the ſlope or fall of the field. When the land is very wet, or has not much fall, there ſhould, in general, be two of theſe to a ſtatute acre; for the ſhorter the narrow drains are, the leſs liable they will be to accidents. The width of the trench for the main drains ſhould be 30 inches at top, but the width at the bottom muſt be regulated by the nature and ſize of the materials intended to be uſed. If the drain is to be made of bricks 10 inches long, 3 inches thick, and 4 inches in breadth, then the bottom of the drain muſt be 12 inches; but if the common ſale bricks are uſed, then the bottom muſt be proportionably contracted. In both caſes there muſt be an interſtice of one inch between the bottom brick and the ſides of the trench, and the vacuity muſt be filled up with ſtraw, ruſhes, or looſe mould. For the purpoſe of making theſe drains, I order my bricks to be moulded 10 inches long, four broad, and three thick; which dimenſions always make the beſt drain.

"The method I purſue in conſtructing my main drains is as follows.—When the ground is ſoft and ſpungy, the bottom of the drain is laid with bricks placed acroſs. On theſe, on each ſide, two bricks are laid flat, one upon the other, forming a drain ſix inches high and four broad; which is covered with bricks, laid flat. When the bottom of the trench is found to be a firm and ſolid body, as clay or marle, the bottom of the drain does not then require being laid with bricks. In that caſe the ſides are formed by placing one brick edgewiſe, inſtead of two laid flat.

"This latter method is much cheaper, and in ſuch land equally durable with the other. When ſtones are uſed inſtead of bricks, the bottom of the drain ſhould be about eight inches in width. And here it will be proper to remark, that, in all caſes, the bottom of the main drains muſt be ſunk four inches below the level of the narrow ones, even at the point where the latter fall into them.

"The main drains ſhould be kept open till the narrow ones are begun from them, after which they may be finiſhed; but before the earth is returned upon the ſtones or bricks, it will be adviſeable to throw in ſtraw, ruſhes, or bruſh-wood, to increaſe the freedom of the drain.

"The ſmall narrow drains ſhould be cut at the diſtance of 16 or 18 feet from each other; and ſhould fall into the main drain at very acute angles, to prevent any ſtoppage. At the point where they fall in, and eight or ten inches above it, they ſhould be made firm with brick or ſtone. Theſe drains ſhould be 18 inches wide at top, and 16 at bottom."—Fig. 9. repreſents a field with drains laid out, according to Mr Bayley's method. The black lines repreſent the main drains, and the dotted lines repreſent the narrow drains communicating with the former from all parts of the field.

Plate XCV

DRAKE, in ornithology, the male of the duck kind. See Anas.

Drake (Sir Francis), the renowned Engliſh admiral, was the ſon of Edmund Drake a ſailor, and born near Taviſtock in Devonſhire, in the year 1545. He was brought up at the expence and under the care of Sir John Hawkins, who was his kinſman; and, at the age of 18, was purſer of a ſhip trading to Biſcay. At 20, he made a voyage to Guiney; and, at 22, had the honour to be made captain of the Judith. In that capacity he was in the harbour of St John de Ulloa, in the gulph of Mexico, where he behaved moſt gallantly in the glorious actions under Sir John Hawkins, and returned with him to England with great reputation, though not worth a groat. Upon this he projected a deſign againſt the Spaniards in the Weſt Indies; which he no ſooner publiſhed, than he had volunteers enough ready to accompany him. In 1570, he made his firſt expedition with two ſhips; and the next year with one only, in which he returned ſafe, if not with ſuch advantages as he expected. He made another expedition in 1572, wherein he did the Spaniards ſome miſchief, and gained conſiderable booties. In theſe expeditions he was much aſſiſted by a nation of Indians, who then were, and have been ever ſince, engaged in perpetual wars with the Spaniards. The prince of theſe people was named *Pedro*; to whom Drake preſented a fine cutlaſs from his ſide, which he ſaw the Indian greatly admired. Pedro, in return, gave him four large wedges of gold; which Drake threw into the common ſtock, ſaying, That he thought it but juſt that ſuch as bore the charge of ſo uncertain a voyage on his credit, ſhould ſhare the utmoſt advantage that voyage produced. Then, embarking his men with all the wealth he had obtained, which was very conſiderable, he bore away for England, where he arrived in Auguſt 1573.

His ſucceſs in this expedition, joined to his honourable behaviour towards his owners, gained him a high reputation; and the uſe he made of his riches, a ſtill greater. For, fitting out three ſtout frigates at his own expence, he ſailed with them to Ireland; where, under Walter earl of Eſſex, the father of the famous unfortunate earl, he ſerved as a volunteer, and did many glorious actions. After the death of his noble patron, he returned into England; where Sir Chriſtopher Hatton

ton introduced him to her majeſty, and procured him countenance and protection at court. By this means he acquired a capacity of undertaking that grand expedition which will render his name immortal. The firſt thing he propoſed was a voyage into the South Seas through the Straits of Magellan; which was what hitherto no Engliſhman had ever attempted. The project was well received at court: the queen furniſhed him with means; and his own fame quickly drew together a ſufficient force. The fleet with which he ſailed on this extraordinary undertaking, conſiſted only of five veſſels, ſmall when compared with modern ſhips, and no more than 164 able men. He ſailed on the 13th of December 1577; on the 25th fell in with the coaſt of Barbary, and on the 29th with cape Verd. On the 13th of March he paſſed the equinoctial, made the coaſt of Brazil on the 5th of April, and entered the River de la Plata, where he loſt the company of two of his ſhips; but meeting them again, and taking out their proviſions, he turned them adrift. On the 29th of May he entered the port of St Julian's, where he continued two months for the ſake of laying in proviſions: on the 20th of Auguſt he entered the Straits of Magellan, and on the 25th of September paſſed them, having then only his own ſhip. On the 25th of November he came to Machao, which he had appointed for a place of rendezvous in caſe his ſhips ſeparated; but captain Winter, his vice admiral, having repaſſed the Straits, was returned to England. Thence he continued his voyage along the coaſts of Chili and Peru, taking all opportunities of ſeizing Spaniſh ſhips, and attacking them on ſhore, till his men were ſated with plunder; and then, coaſting America to the height of 48 degrees, he endeavoured to find a paſſage that way back into our ſeas, but could not. However, he landed, and called the country *New Albion*, taking poſſeſſion of it in the name and for the uſe of queen Elizabeth; and, having careened his ſhip, ſet ſail from thence, on the 29th of September 1579, for the Moluccas. He is ſuppoſed to have choſen this paſſage round, partly to avoid being attacked by the Spaniards at a diſadvantage, and partly from the lateneſs of the ſeaſon, whence dangerous ſtorms and hurricanes were apprehended. On the 13th of October he fell in with certain iſlands inhabited by the moſt barbarous people he had met with in all his voyage: on the 4th of November he had ſight of the Moluccas; and, coming to Ternate, was extremely well received by the king thereof, who appears, from the moſt authentic relations of this voyage, to have been a wiſe and polite prince. On the 10th of December he made Celebes; where his ſhip unfortunately ran upon a rock, the 9th of January following; from which, beyond all expectation, and in a manner miraculouſly, they got off, and continued their courſe. On the 16th of March he arrived at Java Major; and from thence he intended to have directed his courſe to Malacca; but found himſelf obliged to alter his purpoſe; and to think of returning home. On the 25th of March 1580, he put this deſign in execution; and on the 15th of June he doubled the Cape of Good Hope, having then on board 57 men, and but three caſks of water. On the 12th of July he paſſed the line, reached the coaſt of Guiney on the 16th, and there watered. On the 11th of September he made the iſland of Tercera; and on the 3d of November entered the harbour of Plymouth. This voyage round the world was performed in two years and about ten months. Shortly after his arrival, the queen going to Deptford, went on board his ſhip; where, after dinner, ſhe conferred on him the order of knighthood, and declared her abſolute approbation of all he had done. She likewiſe gave directions for the preſervation of his ſhip, that it might remain a monument of his own and his country's glory. This celebrated ſhip, which had been contemplated many years at Deptford, at length decaying, it was broke up, and a chair, made out of the planks, was preſented to the univerſity of Oxford; upon which the famous Abraham Cowley made the following verſes:

> " To this great ſhip, which round the world has run,
> " And match'd in race the chariot of the ſun;
> " This Pythagorean ſhip (for it may claim,
> " Without preſumption, ſo deſerv'd a name,
> " By knowledge once, and transformation now)
> " In her new ſhape this ſacred port allow.
> " Drake and his ſhip could not have wiſh'd, from fate,
> " An happier ſtation, or more bleſs'd eſtate:
> " For, lo! a ſeat of endleſs reſt is given,
> " To her in Oxford, and to him in heaven.
>
> WORKS, Vol. II.

In the year 1585, he ſailed with a fleet to the Weſt Indies; and took the cities of St Jago, St Domingo, Carthagena, and St Auguſtin. In 1587, he went to Liſbon with a fleet of 30 ſail; and, having intelligence of a great fleet aſſembled in the bay of Cadiz, which was to have made part of the armada, he with great courage entered that port, and burnt there upwards of 10,000 tons of ſhipping: which he afterwards merrily called *burning the king of Spain's beard*. In 1588, when the armada from Spain was approaching our coaſts, Sir Francis Drake was appointed vice-admiral under Charles lord Howard of Effingham, high admiral of England, where fortune favoured him as remarkably as ever: for he made prize of a very large galleon, commanded by Don Pedro de Valdez, who was reputed the projector of this invaſion. This affair happened in the following manner: On the 22d of July, Sir Francis obſerving a great Spaniſh ſhip floating at a diſtance from both fleets, ſent his pinnace to ſummon the commander to yield. Valdez replied, with much Spaniſh ſolemnity, that they were 450 ſtrong; that he himſelf was Don Pedro, and ſtood much upon his honour; and thereupon propounded ſeveral conditions, upon which he was willing to yield. But the vice-admiral replied, That he had no leiſure to parley: but if he thought fit inſtantly to yield, he might; if not, he ſhould ſoon find that Drake was no coward. Pedro, hearing the name of Drake, immediately yielded, and with 46 of his attendants came on board Drake's ſhip. This Don Pedro remained about two years Sir Francis Drake's priſoner in England; and, when he was releaſed, paid him for his own and his captains liberties, a ranſom of 3500l. Drake's ſoldiers were well recompenſed with the plunder of this ſhip: for they found in it 55000 ducats of gold, which was divided among them.

A little before this formidable Spaniſh armament put to ſea, the ambaſſador of his Catholic majeſty had the confidence to propound to queen Elizabeth, in Latin verſe, the terms upon which ſhe might hope for peace; which, with an Engliſh tranſlation by Dr Fuller, we will inſert in this place, becauſe Drake's expedition to the Weſt Indies makes a part of this meſſage. The verſes are theſe:

Te veto ne pergas bello defendere Belgas:
Quæ Dracus eripuit nunc reſtituantur oportet:
Quas pater evertit jubeo te condere cellas:
Religio Papæ fac reſtituatur ad unguem.
“ Theſe to you are our commands,
“ Send no help to th' Netherlands:
“ Of the treaſure took by Drake,
“ Reſtitution you muſt make:
“ And thoſe abbeys build anew,
“ Which your father overthrew:
“ If for any peace you hope,
“ In all points reſtore the pope.”

The queen's extempore return,

Ad Græcas, bone rex, fient mandata calendas.
“ Worthy king, know, this your will
“ At Latter-Lammas we'll fulfil.

In the year 1589, Sir Francis Drake commanded as admiral the fleet ſent to reſtore Don Antonio king of Portugal, the command of the land-forces being given to Sir John Norris: but they were hardly got to ſea, before the commanders differed, and ſo the attempt proved abortive. The war with Spain continuing, a more effectual expedition was undertaken by Sir John Hawkins and Sir Francis Drake, againſt their ſettlements in the Weſt Indies, than had hitherto been made during the whole courſe of it: but the commanders here again not agreeing about the plan, this alſo did not turn out ſo ſucceſsfully as was expected. All difficulties, before theſe two laſt expeditions, had given way to the ſkill and fortune of Sir Francis Drake; which probably was the reaſon, why he did not bear theſe diſappointments ſo well as he otherwiſe would have done. A ſtrong ſenſe of them is ſuppoſed to have thrown him into a melancholy, which ocaſioned a bloody flux; and of this he died on board his own ſhip, near the town of Nombre de Dios in the Weſt Indies, on the 28th of January 1595-6. His death was lamented by the whole nation, and particularly by his countrymen; who had great reaſon to love him from the circumſtances of his private life, as well as to eſteem him in his public character. He was elected burgeſs for the town of Boſſiney, alias Tintagal, in the county of Cornwall, in the 27th parliament of queen Elizabeth; and for Plymouth in Devonſhire, in the 35th of the ſame reign. This town had very particular obligations to him: for, in the year 1587, he undertook to bring water into it, through the want of which, till then, it had been grievouſly diſtreſſed; and he performed it by conducting thither a ſtream from ſprings at eight miles diſtance, that is to ſay, in a ſtraight line: for in the manner he brought it, the courſe of it runs upwards of 20 miles.

DRAKENBORCH (Arnold), profeſſor of eloquence and hiſtory at Utrecht, made himſelf known by ſeveral works, and particularly by his Notes on Titus Livius and Silius Italicus; his fine editions of which are highly eſteemed.

DRAMA, a poem containing ſome certain action, and repreſenting a true picture of human life, for the delight and improvement of mankind.

The principal ſpecies of the drama are two, comedy and tragedy. Some others there are of leſs note, as paſtoral, ſatire, tragi-comedy, opera, &c *.

DRAMATIC, an epithet given to pieces written for the ſtage. See POETRY, chap. ii.

DRANK, among farmers, a term uſed to denote wild oats, which never fail to infeſt worn-out lands; ſo that, when ploughed lands run to theſe weeds and thiſtles, the farmer knows it is high time to fallow them, or elſe to ſow them with hay-ſeed, and make paſture of them.

DRAPERY, in ſculpture and painting, ſignifies the repreſentation of the clothing of human figures, and alſo hangings, tapeſtry, curtains, and moſt other things that are not carnations or landſcapes. See PAINTING, nº 10.; CRAYON-*Painting*, ſect. ii.; and DRAWING, par. 8.

DRASTIC, in phyſic, an epithet beſtowed on ſuch medicines as are of preſent efficacy, and potent in operation; and is commonly applied to emetics and cathartics.

DRAVE, a large navigable river, which, taking its riſe in the archbiſhopric of Saltzburg, in Germany, runs ſouth-eaſt through Stiria; and continuing its courſe, divides Hungary from Sclavonia, and falls into the Danube at Eſſeck.

DRAUGHT, in trade, called alſo *cloff* or *clouch*, is a ſmall allowance on weighable goods, made by the king to the importer, or by the ſeller to the buyer, that the weight may hold out when the goods are weighed again.

The king allows 1 ℔ draught for goods weighing no leſs than 1 Cwt. 2 ℔ for goods weighing between 1 and 2 Cwt. 3 ℔ for goods weighing between 2 and 3 Cwt. 4 ℔ from 3 to 10 Cwt. 7 ℔ from 10 to 18 Cwt. 9 ℔ from 18 to 30 or upwards.

DRAUGHT-*Hooks*, are large hooks of iron, fixed on the cheeks of a cannon-carriage, two on each ſide, one near the trunnion hole, and the other at the train, diſtinguiſhed by the name of *fore* and *hind draught-hooks*. Large guns have draught-hooks near the middle tranſom, to which are fixed the chains that ſerve to keep the ſhafts of the limbers on a march. The fore and hind hooks are uſed for drawing a gun backwards or forwards, by men with ſtrong ropes, called *draught-ropes*, fixed to theſe hooks.

DRAUGHT, the depth of a body of water neceſſary to float a ſhip; hence a ſhip is ſaid to draw ſo many feet of water, when ſhe is borne up by a column of water of that particular depth. Thus, if it requires a body of water whoſe depth is equal to 12 feet, to float or buoy up a ſhip on its ſurface, ſhe is ſaid to draw 12 feet water; and that this draught may be more readily known, the feet are marked on the ſtem and ſtern poſt, regularly from the keel upwards.

DRAUGHT-*Horſe*, in farming, a ſort of coarſe-made horſe, deſtined for the ſervice of a cart or plough.

DRAWBACK, in commerce, certain duties, either of the cuſtoms or of the exciſe, allowed upon the exportation of ſome of our own manufactures; or upon certain foreign merchandiſe, that have paid duty on importation.

The oaths of the merchants importing and exporting are required to obtain the drawback on foreign goods, affirming the truth of the officers certificate on the entry, and the due payment of the duties: and theſe may be made by the agent or huſband of any corporation or company; or by the known ſervant of any merchant,

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* See the article *Poetry*.

merchant uſually employed in making his entries, and paying his cuſtoms. In regard to foreign goods entered outward, if leſs quantity or value be fraudulently ſhipped out than what is expreſſed in the exporter's certificate, the goods therein mentioned, or their value, are forfeited, and no drawback to be allowed for the ſame. Foreign goods exported by certificate in order to obtain the draw-back, not ſhipped or exported, or relanded in Great Britain, unleſs in caſe of diſtreſs to ſave them from periſhing, are to loſe the benefit of the draw-back, and are forfeited, or their value, with the veſſels, horſes, carriages, &c. employed in the relanding thereof; and the perſons employed in the relanding them, or by whoſe privity they are relanded, or into whoſe hands they ſhall knowingly come, are to forfeit double the amount of the drawback. Officers of the cuſtoms conniving at or aſſiſting in any fraud relating to certificate goods, beſides other penalties, are to forfeit their office, and ſuffer ſix months impriſonment without bail or mainprize; as are alſo maſters, or perſons belonging to the ſhips employed therein. Bonds given for the exportation of certificate-goods to Ireland muſt not be delivered up, nor drawback allowed for any goods, till a certificate under the hands and ſeals of the collector or comptroller, &c. of the cuſtoms be produced, teſtifying the landing.

Draw-*Bridge*, a bridge made after the manner of a float, to draw up, or let down, as occaſion ſerves, before the gate of a town or caſtle. See Bridge.

A draw-bridge may be made after ſeveral different ways; but the moſt common are made with plyers, twice the length of the gate, and a foot in diameter. The inner ſquare is traverſed with a croſs, which ſerves for a counterpoiſe; and the chains which hang from the extremities of the plyers to lift up or let down the bridge, are of iron or braſs.

In navigable rivers it is ſometimes neceſſary to make the middle arch of bridges with two moveable platforms, to be raiſed occaſionally, in order to let the maſts and rigging of ſhips paſs through. This kind of draw-bridge is repreſented in Plate XCVI. where A B is the width of the middle arch; A L and B L, the two piers that ſupport the draw-bridge NO, one of the platforms of which is raiſed, and the other let down, having the beam PQ for its plyer. To NO are ſuſpended two moveable braces EH, EH; which reſting on the ſupport E, preſs againſt the bracket M, and thereby ſtrengthen the draw-bridge. Theſe braces are conducted to the reſt by means of the weight S, pulling the chain SLF.

Draw-*Net*, a kind of net for taking the larger ſort of wild-fowl, which ought to be made of the beſt ſort of pack-thread, with wide meſhes; they ſhould be about two fathoms deep and ſix long, verged on each ſide with a very ſtrong cord, and ſtretched at each end on long poles. It ſhould be ſpread ſmooth and flat upon the ground; and ſtrewed over with graſs, ſedge, or the like, to hide it from the fowl; and the ſportſman is to place himſelf in ſome ſhelter of graſs, fern, or ſome ſuch thing.

DRAWING, in general, denotes the action of pulling out, or haling along; thus we read of tooth-drawing, wire-drawing, &c.

DRAWING,

THE art of repreſenting the appearances of objects by imitation, or copying without the aſſiſtance of mathematical rules.

1. *Of the proper Materials for drawing, and the manner of uſing them.* The firſt thing neceſſary for a beginner is to furniſh himſelf with proper materials, ſuch as black-lead pencils, crayons * of black, white, or red chalk, crow-quill pens, a rule and compaſſes, camels-hair pencils, and Indian ink. He muſt accuſtom himſelf to hold the pencil farther from the point than one does a pen in writing; which will give him a better command of it, and contribute to render the ſtrokes more free and bold. The uſe of the pencil is to draw the firſt ſketches or outlines of the piece, as any ſtroke or line that is amiſs may in this be more eaſily rubbed out than in any other thing; and when he has made the ſketch as correct as he can with the pencil, he may then draw carefully the beſt outline he has got, with his crow-quill pen and (a) ink; after which he may diſcharge the pencil-lines, by rubbing the piece gently with the crumb of ſtale bread. Having thus got the outline clear, his next work is to ſhade the piece properly, either by drawing fine ſtrokes with his pen where it requires to be ſhaded, or by waſhing it with his pencil and the Indian ink. As to his rule and compaſſes, they are never or very rarely to be uſed, except in meaſuring the proportions of figures after he has drawn them, to prove whether they are right or not; or in houſes, fortifications, and other pieces of architecture.

2. *Of drawing Lines, Squares, Circles, and other regular and irregular figures.* Having got all theſe implements in readineſs, the firſt practice muſt be to draw ſtraight and curve lines, with eaſe and freedom, upwards and downwards, ſideways to the right or left, or in any direction whatſoever. He muſt alſo learn to draw, by command of hand, ſquares, circles, ovals, and other geometrical figures: for as the alphabet, or a knowledge of the letters, is an introduction to grammar; ſo is geometry to drawing. The practice of drawing theſe ſimple figures * till he is maſter of them, will enable him to imitate, with greater eaſe and accuracy, many things both in nature and art. And here it is proper to admoniſh him, never to be in a hurry; but to make himſelf perfectly maſter of one figure before he proceeds to another: the advantage, and even neceſſity, of this, will appear as he proceeds. Two obſervations more may be added: 1. That he accuſtom himſelf to draw all his figures very large, which is the only way of acquiring a free bold manner of deſigning.

* See Plate XCVI.

(a) The ink made uſe of for this purpoſe muſt not be common, but Indian ink; which is much ſofter than the other, and does not run: by mixing it with water, it may be made to any degree of ſtrength, and uſed in a pen like common ink.

ing. 2. That he practiſe drawing till he has gained a tolerable maſtery of his pencil, before he attempts to ſhadow any figure or object of any kind whatever.

3. *Of Light and Shade.* After the learner has made himſelf in ſome meaſure perfect in drawing outlines, his next endeavour muſt be to ſhade them properly. It is this which gives an appearance of ſubſtance, ſhape, diſtance, and diſtinction, to whatever bodies he endeavours to repreſent, whether animate or inanimate. The beſt rule for doing this is, to conſider from what point, and in what direction, the light falls upon the objects which he is delineating, and to let all his lights and ſhades be placed according to that direction throughout the whole work. That part of the object muſt be lighteſt, which hath the light moſt directly oppoſite to it; if the light falls ſideways on the picture, he muſt make that ſide which is oppoſite to it lighteſt, and that ſide which is fartheſt from it darkeſt. If he is drawing the figure of a man, and the light be placed above the head, then the top of the head muſt be made lighteſt, the ſhoulders next lighteſt, and the lower parts darker by degrees. That part of the object, whether in naked figures, or drapery, or buildings, that ſtands fartheſt out, muſt be made the lighteſt, becauſe it comes neareſt to the light; and the light loſeth ſo much of its brightneſs, by how much any part of the body bends inward, becauſe thoſe parts that ſtick out hinder the luſtre and full brightneſs of the light from ſtriking on thoſe parts that fall in. Titian uſed to ſay, that he knew no better rule for the diſtribution of lights and ſhadows, than his obſervations drawn from a bunch of grapes. Sattins and ſilks, and all other ſhining ſtuffs, have certain glancing reflections, exceeding bright, where the light falls ſtrongeſt. The like is ſeen in armour, braſs-pots, or any other glittering metal, where you ſee a ſudden brightneſs in the middle or centre of the light, which diſcovers the ſhining nature of ſuch things. Obſerve alſo, that a ſtrong light requires a ſtrong ſhade, a fainter light a fainter ſhade; and that an equal balance be preſerved throughout the piece between the lights and ſhades. Thoſe parts which muſt appear round, require but one ſtroke in ſhading, and that ſometimes but very faint; ſuch parts as ſhould appear ſteep or hollow, require two ſtrokes acroſs each other, or ſometimes three, which is ſufficient for the deepeſt ſhade. Care muſt be alſo taken to make the outlines faint and ſmall in ſuch parts as receive the light; but where the ſhades fall, the outline muſt be ſtrong and bold. The learner muſt begin his ſhadings from the top, and proceed downward, and uſe his utmoſt endeavours both by practice and obſervation to learn how to vary the ſhadings properly; for in this conſiſts a great deal of the beauty and elegance of drawing. Another thing to be obſerved is, that as the human ſight is weakened by diſtances, ſo objects muſt ſeem more or leſs confuſed or clear according to the places they hold in the piece: Thoſe that are very diſtant,—weak, faint, and confuſed; thoſe that are near and on the foremoſt ground,—clear, ſtrong, and accurately finiſhed.

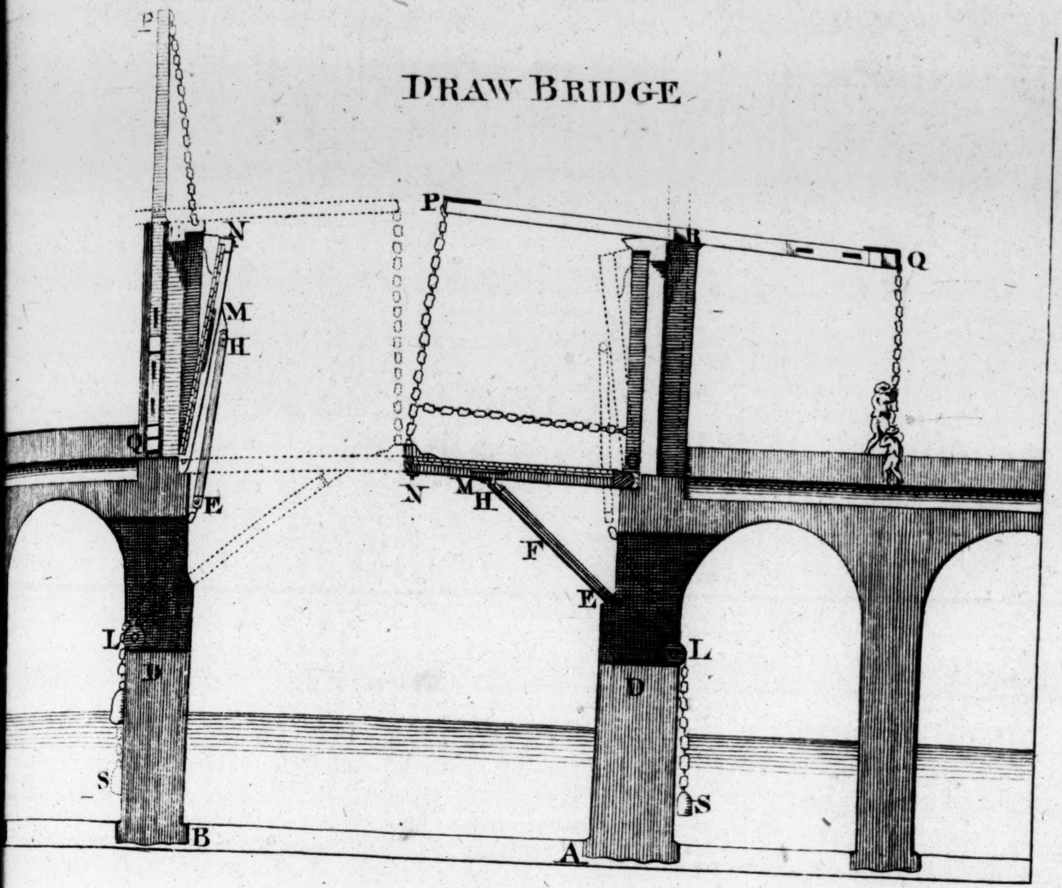
4. *Of drawing Flowers, Fruits, Birds, Beaſts, &c.* The learner may proceed now to make ſome attempts at drawing flowers, fruits, birds, beaſts, and the like; not only as it will be a more pleaſing employment, but as it is an eaſier taſk, than the drawing of hands and feet, and other parts of the human body, which require not only more care, but greater exactneſs and nicer judgment. Very few rules or inſtructions are requiſite upon this head; the beſt thing the learner can do is, to furniſh himſelf with good prints or drawings by way of examples, and with great care and exactneſs to copy them. If it is the figure of a beaſt, begin with the forehead, and draw the noſe, the upper and under jaw, and ſtop at the throat. Then go to the top of the head, and form the ears, neck, back, and continue the line till you have given the full ſhape of the buttock. Then form the breaſt, and mark out the legs and feet, and all the ſmaller parts. And, laſt of all, finiſh it with the proper ſhadows. It is not amiſs, by way of ornament, to give a ſmall ſketch of landſkip; and let it be ſuitable and natural to the place or country of the beaſt you draw. Much the ſame may be ſaid with regard to birds. Of theſe, as well as beaſts and other objects, the learner will find many examples among the plates given in this work.

5. *Of drawing Eyes, Ears, Legs, Arms, Hands, Feet, &c.* As to the drawing of eyes and ears, legs and arms, the learner will have very little more to do than to copy carefully the examples given in Plate XCVI. XCVII. But the actions and poſtures of the hands are ſo many and various, that no certain rules can be given for drawing them, that will univerſally hold good. Yet as the hands and feet are difficult members to draw, it is very neceſſary, and well worth while, to beſtow ſome time and pains about them; carefully imitating their various poſtures and actions, ſo as not only to avoid all lameneſs and imperfection, but alſo to give them life and ſpirit. To arrive at this, great care, ſtudy, and practice, are requiſite; particularly in imitating the beſt prints or drawings that can be got of hands and feet, (ſome good examples of which are given in Plate XCVII.); for, as to the mechanical rules of drawing them by lines and meaſures, they are not only perplexed and difficult, but alſo contrary to the practice of the beſt maſters. One general rule, however, may be given, (which is univerſally to be obſerved in all ſubjects), and that is, Not to finiſh perfectly at firſt any ſingle part, but to ſketch out faintly, and with light ſtrokes of the pencil, the ſhape and proportion of the whole hand, with the action and turn of it; and after conſidering carefully whether this firſt ſketch be perfect, and altering it wherever it is amiſs, you may then proceed to the bending of the joints, the knuckles, the veins, and other ſmall particulars, which, when the learner has got the whole ſhape and proportion of the hand or foot, will not only be more eaſily but alſo more perfectly deſigned.

6. *Of drawing Faces.* The head is uſually divided into four equal parts. (1.) From the crown of the head to the the top of the forehead. (2.) From the top of the forehead to the eye-brows. (3.) From the eye-brows to the bottom of the noſe. (4.) From thence to the bottom of the chin. But this proportion is not conſtant; thoſe features in different men being often very different as to length and ſhape. In a well-proportioned face, however, they are nearly right. To direct the learner therefore in forming a perfect face, his firſt buſineſs is to draw a complete oval; in the middle of which, from the top to the bottom, draw a perpendicular line. Through the centre or middle of

this

DRAW BRIDGE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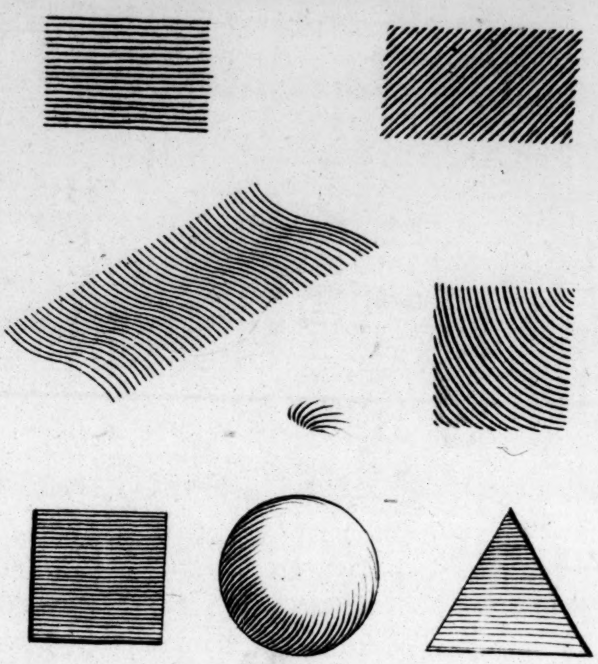
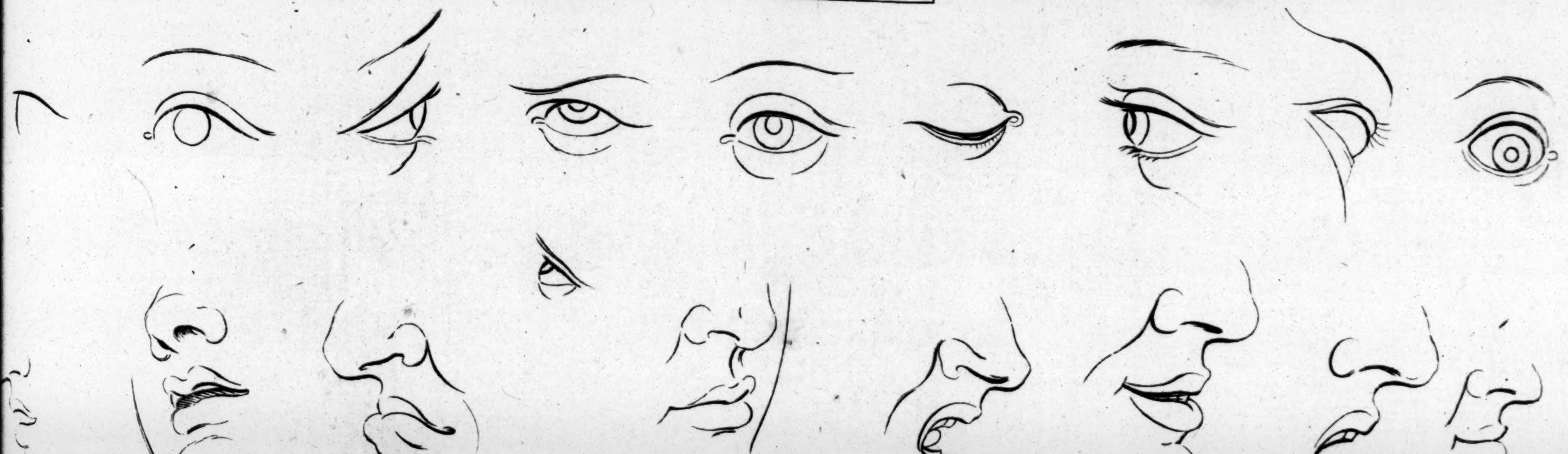
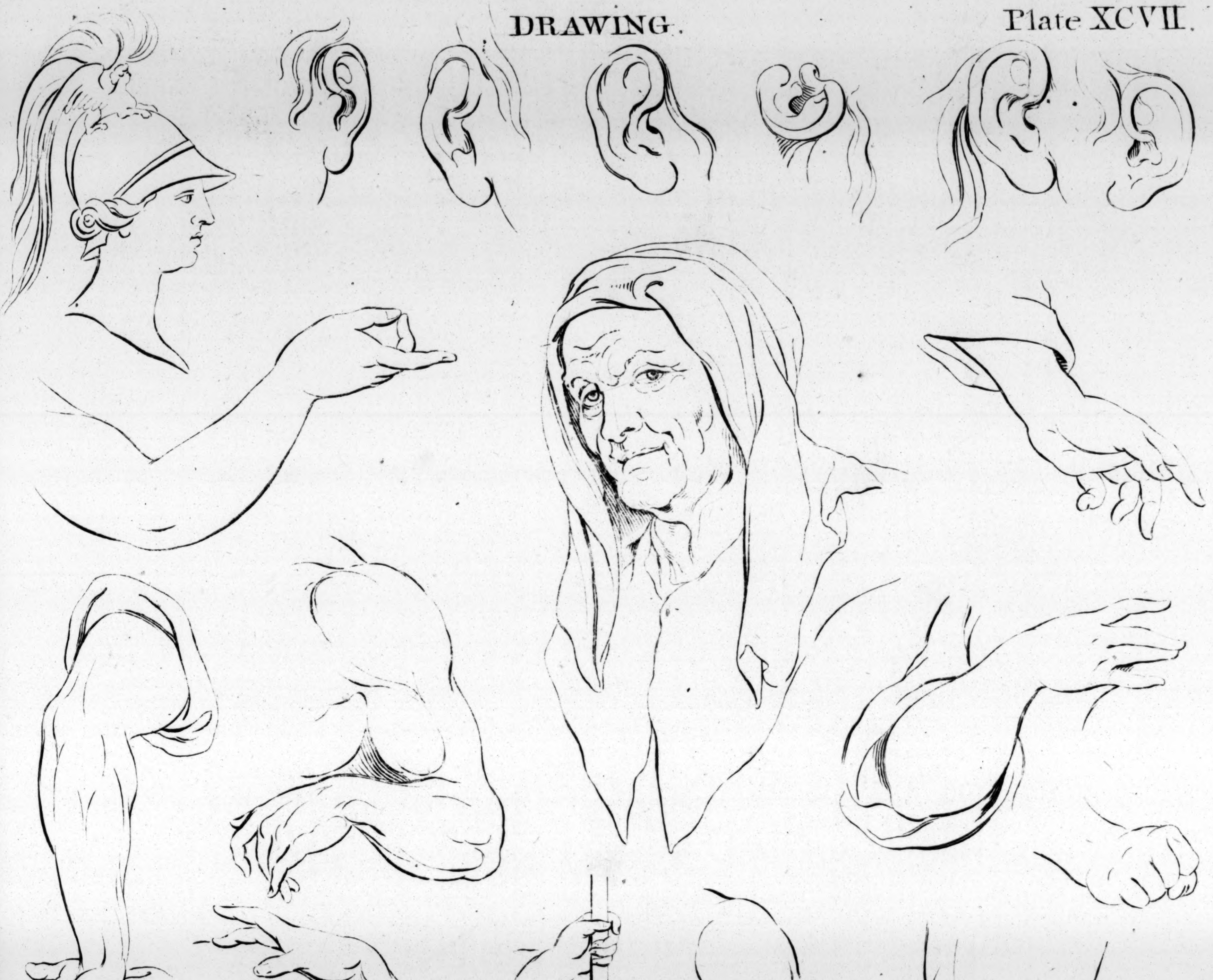




A Bell Sculpt.

3 MA 53

DRAWING.



A Bell Sculp^t

3 MA 55

his line draw a diameter line, directly acroſs from one ſide to the other of your oval. On theſe two lines all the features of your face are to be placed as follows. Divide your perpendicular line into four equal parts: the firſt muſt be allotted to the hair of the head; the ſecond is from the top of the forehead to the top of the noſe between the eye-brows; the third is from thence to the bottom of the noſe; and the fourth includes the lips and chin. Your diameter line, or the breadth of the face, is always ſuppoſed to be the length of five eyes; you muſt therefore divide it into five equal parts, and place the eyes upon it ſo as to leave exactly the length of one eye betwixt them. This is to be underſtood only of a full front face; for if it turn to either ſide, then the diſtances are to be leſſened on that ſide which turns from you, leſs or more in proportion to its turning. The top of the ear is to riſe parallel to the eye-brows, at the end of the diameter line; and the bottom of it muſt be equal to the bottom of the noſe. The noſtrils ought not to come out further than the corner of the eye in any face; and the middle of the mouth muſt always be placed upon the perpendicular line. See Plate XCVI.

7. *Of drawing Human Figures.* When the learner is tolerably perfect in drawing hands, feet, heads, and faces, he may next attempt to draw the human figure at length. In order to which, let him firſt form his oval for the head; then draw a perpendicular line from the bottom of the head ſix times its length, (for the length of the head is one-ſeventh part of the length of the figure.)

The beſt proportioned figures of the ancients are 7 heads $\frac{1}{2}$ in height. If, therefore, the figure ſtands upright, draw a perpendicular line from the top of the head to the heel, which muſt be divided into two equal parts. The bottom of the belly is exactly the centre. Divide the lower part into two equal parts again, the middle of which is the middle of the knee. For the upper part of the figure, the method muſt be varied. Take off with your compaſſes the length of the face, (which is 3 parts in 4 of the length of the head); from the throat-pit to the pit of the ſtomach is one face, from thence to the navel is another, and from thence to the lower rim of the belly is a third. The line muſt be divided into ſeven equal parts. Againſt the end of the firſt diviſion, place the breaſts; the ſecond comes down to the navel; the third, to the privities; the fourth to the middle of the thigh; the fifth, to the lower part of the knee; the ſixth, to the lower part of the calf; and the ſeventh, to the bottom of the heel, the heel of the bearing leg being always exactly under the pit of the throat. But, as the eſſence of all drawing conſiſts in making at firſt a good ſketch, the learner muſt in this particular be very careful and accurate; he ought to draw no one part perfect or exact, till he ſee whether the whole draught be good; and when he has altered that to his mind, he may then finiſh one part after another as curiouſly as he can.

There are ſome who, having a ſtatue to copy, begin with the head, which they finiſh, and then proceed in the ſame manner to the other parts of the body, finiſhing as they go: but this method generally ſucceeds ill; for if they make the head in the leaſt too big, or too little, the conſequence is a diſproportion between all the parts, occaſioned by their not having ſketched the whole proportionably at firſt. Let the learner remember, therefore, in whatever he intends to draw, firſt to ſketch its ſeveral parts, meaſuring the diſtances and proportions between each with his finger or pencil, without uſing the compaſſes; and then judge of them by the eye, which by degrees will be able to judge of truth and proportion, and will become his beſt and principal guide. And let him obſerve, as a general rule, Always to begin with the right ſide of the piece he is copying: for by that means he will always have what he has done before his eyes; and the reſt will follow more naturally, and with greater eaſe: whereas if he begin with the left ſide, his hand and arm will cover what he does firſt, and deprive him of the ſight of it; by which means he will not be able to proceed with ſo much eaſe, pleaſure, or certainty.

As to the order and manner of proceeding in drawing the human body, he muſt firſt ſketch the head; then the ſhoulders in the exact breadth; then draw the trunk of the body, beginning with the arm-pits (leaving the arms till afterwards), and ſo draw down to the hips on both ſides; and be ſure he obſerve the exact breadth of the waiſt. When he has done this, let him then draw that leg which the body ſtands upon, and afterwards the other which ſtands looſe; then the arms, and laſt of all the hands.

He muſt take notice alſo of the bowings and bendings that are in the body; making the part which is oppoſite to that which bends, correſpond to it in bending with it. For inſtance: If one ſide of the body bend in, the other muſt ſtand out anſwerable to it; if the back bend in, the belly muſt ſtick out; if the knee bend out, the ham muſt fall in; and ſo of any other joint in the body. Finally, he muſt endeavour to form all the parts of the figure with truth, and in juſt proportion: not one arm or one leg bigger or leſs than the other; not broad Herculean ſhoulders, with a thin and ſlender waiſt; nor raw and bony arms, with thick and gouty legs: but let there be a kind of harmonious agreement amongſt the members, and a beautiful ſymmetry throughout the whole figure.

We ſhall conclude this head by giving, from Freſnoy, *The Meaſures of the Human Body.* The ancients have commonly allowed eight heads to their figures, though ſome of them have but ſeven: but we ordinarily divide the figures into ten faces; that is to ſay, from the crown of the head to the ſole of the foot, in the following manner.

From the crown of the head to the forehead is the third part of a face.

The face begins at the root of the loweſt hairs which are upon the forehead, and ends at the bottom of the chin.

The face is divided into three proportional parts; the firſt contains the forehead, the ſecond the noſe, and the third the mouth and chin.

From the chin to the pit betwixt the collar-bones, are two lengths of a noſe.

From the pit betwixt the collar-bones to the bottom of the breaſt, one face.

From the bottom of the breaſt to the navel, one face.

From the navel to the genitals, one face.

From the genitals to the upper part of the knees, two faces.

The knee contains half a face.

From the lower part of the knee to the ankle, two faces.

From the ankle to the ſole of the foot, half a face.

A man, when his arms are ſtretched out, is, from the longeſt finger of his right hand to the longeſt of his left, as broad as he is long.

From one ſide of the breaſts to the other, two faces.

The bone of the arm called *humerus*, is the length of two faces, from the ſhoulder to the elbow.

From the end of the elbow to the root of the little finger, the bone called *cubitus*, with part of the hand, contains two faces.

From the box of the ſhoulder-blade to the pit betwixt the collar-bones, one face.

If you would be ſatisfied in the meaſures of breadth from the extremity of one finger to the other, ſo that this breadth ſhould be equal to the length of the body, you muſt obſerve, that the boxes of the elbows with the *humerus*, and of the *humerus* with the ſhoulder-blade, bear the proportion of half a face, when the arms are ſtretched out.

The ſole of the foot is the ſixth part of the figure.

The hand is the length of the face.

The thumb contains a noſe.

The inſide of the arm, from the place where the muſcle diſappears, which makes the breaſt, called the *pectoral muſcle*, to the middle of the arm, four noſes.

From the middle of the arm to the beginning of the hand, five noſes.

The longeſt toe is a noſe long.

The two utmoſt parts of the teats and the pit betwixt the collar-bones of a woman, make an equilateral triangle.

For the breadth of the limbs, no preciſe meaſure can be given; becauſe the meaſures themſelves are changeable, according to the quality of the perſons, and according to the movements of the muſcles.

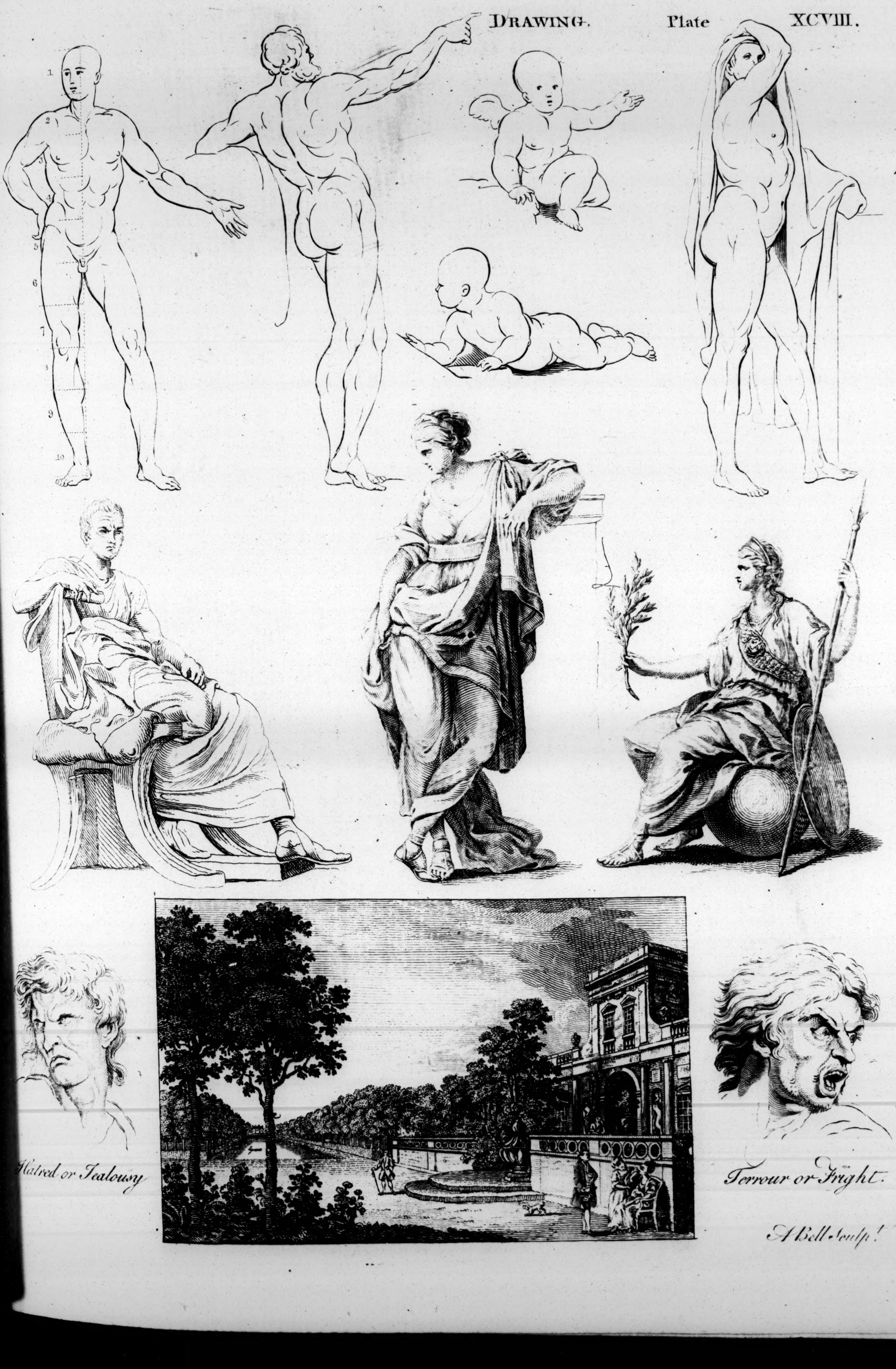
8. *Of Drapery.* In the art of cloathing the figures, or caſting the drapery properly and elegantly upon them, many things are to be obſerved. 1. The eye muſt never be in doubt of its object; but the ſhape and proportion of the part or limb, which the drapery is ſuppoſed to cover, muſt appear; at leaſt ſo far as art and probability will permit: and this is ſo material a conſideration, that many artiſts draw firſt the naked figure, and afterwards put the draperies upon it. 2. The drapery muſt not ſit too cloſe to the parts of the body: but let it ſeem to flow round, and as it were to embrace them; yet ſo as that the figure may be eaſy, and have a free motion. 3. The draperies which cover thoſe parts that are expoſed to great light, muſt not be ſo deeply ſhaded as to ſeem to pierce them; nor ſhould thoſe members be croſſed by folds that are too ſtrong, leſt by the too great darkneſs of their ſhades the members look as if they were broken. 4. The great folds muſt be drawn firſt, and then ſtroked into leſſer ones: and great care muſt be taken that they do not croſs one another improperly. 5. Folds in general ſhould be large, and as few as poſſible. However, they muſt be greater or leſs according to the quantity and quality of the ſtuffs of which the drapery is ſuppoſed to be made. The quality of the perſons is alſo to be conſidered in the drapery. If they are magiſtrates, their draperies ought to be large and ample; if country clowns or ſlaves, they ought to be coarſe and ſhort; if ladies or nymphs, light and ſoft. 6. Suit the garments to the body, and make them bend with it, according as it ſtands in or out, ſtraight or crooked; or as it bends one way or another; and the cloſer the garment ſits to the body, the narrower and ſmaller muſt be the folds. 7. Folds well-imagined give much ſpirit to any kind of action; becauſe their motion implies a motion in the acting member, which ſeems to draw them forcibly, and makes them more or leſs ſtirring as the action is more or leſs violent. 8. An artful complication of folds in a circular manner greatly helps the effect of fore-ſhortenings. 9. All folds conſiſt of two ſhades, and no more; which you may turn with the garment at pleaſure, ſhadowing the inner ſide deeper, and the outer more faintly. 10. The ſhades in ſilk and fine linen are very thick and ſmall, requiring little folds and a light ſhadow. 11. Obſerve the motion of the air or wind, in order to draw the looſe apparel all flying one way: and draw that part of the garment that adheres cloſeſt to the body, before you draw the looſer part that flies off from it; leſt, by drawing the looſe part of the garment firſt, you ſhould miſtake the poſition of the figure, and place it awry. 12. Rich ornaments, when judiciouſly and ſparingly uſed, may ſometimes contribute to the beauty of draperies. But ſuch ornaments are far below the dignity of angels or heavenly figures; the grandeur of whoſe draperies ought rather to conſiſt in the boldneſs and nobleneſs of the folds, than in the quality of the ſtuff, or the glitter of ornaments. 13. Light and flying draperies are proper only to figures in great motion, or in the wind: but when in a calm place, and free from violent action, their draperies ſhould be large and flowing; that, by their contraſt and the fall of the folds, they may appear with grace and dignity. And thus much for drapery; an example or two of which are given in Plate XCVIII. But ſee farther the articles CRAYON-*Painting*, ſect. ii.; and PAINTING, n° 10.

9. *On the Paſſions.* The paſſions, ſays M. Le Brun, are motions of the ſoul, either upon her purſuing what ſhe judges to be for her good, or ſhunning what ſhe thinks hurtful to her; and commonly, whatever cauſes emotion of paſſion in the ſoul, creates alſo ſome action in the body. It is therefore neceſſary for a painter to know which are the different actions in the body that expreſs the ſeveral paſſions of the ſoul, and how to delineate them.

M. Le Brun has been extremely happy in expreſſing many of the paſſions, and you cannot ſtudy any thing better than the examples which he has left us of them, a few of which are carefully copied in Plates XCV. and XCVIII. However, as M. De Piles juſtly obſerves, it is abſurd as well as impoſſible to pretend to give ſuch particular demonſtrations of them as to fix their expreſſion to certain ſtrokes, which the painter ſhould be obliged to make uſe of as eſſential and invariable rules. This, ſays he, would be depriving the art of that excellent variety of expreſſion which has no other principle than diverſity of imagination, the number of which is infinite. The ſame paſſion may be finely expreſſed ſeveral ways, each yielding more or leſs pleaſure in proportion to the painter's underſtanding and the ſpectator's diſcernment.

Though every part of the face contributes towards expreſſing the ſentiments of the heart, yet the eyebrow, according to M. Le Brun, is the principal ſeat of

DRAWING. Plate XCVIII.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Hatred or Jealousy
Terrour or Fright.
A Bell sculp.

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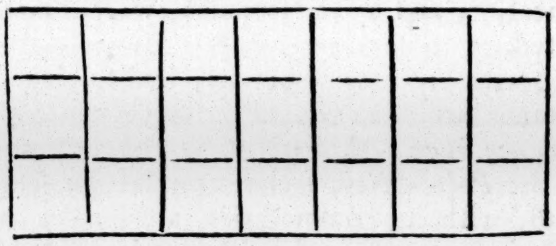
of expreſſion, and where the paſſions beſt make themſelves known. It is certain, ſays he, that the pupil of the eye, by its fire and motion, very well ſhews the agitation of the ſoul, but then it does not expreſs the kind or nature of ſuch an agitation; whereas the motion of the eye-brow differs according as the paſſions change their nature. To expreſs a ſimple paſſion, the motion is ſimple; to expreſs a mixed paſſion, the motion is compound: if the paſſion be gentle, the motion is gentle; and if it be violent, the motion is ſo too. We may obſerve farther, ſays he, that there are two kinds of elevation in the eye-brows. One, in which the eye-brows riſe up in the middle; this elevation expreſſes agreeable ſenſations, and it is to be obſerved that then the mouth riſes at the corners: Another, in which the eye-brows riſe up at the ends, and fall in the middle; this motion denotes bodily pain, and then the mouth falls at the corners. In laughter, all the parts agree; for the eye-brows, which fall toward the middle of the forehead, make the noſe, the mouth, and the eyes, follow the ſame motion. In weeping, the motions are compound and contrary; for the eye-brows fall toward the noſe and over the eyes, and the mouth riſes that way. It is to be obſerved alſo, that the mouth is the part of the face which more particularly expreſſes the emotions of the heart: for when the heart complains, the mouth falls at the corners; when it is at eaſe, the corners of the mouth are elevated; and when it has an averſion, the mouth ſhoots forward, and riſes in the middle.

"The head, ſays M. De Piles, contributes more to the expreſſion of the paſſions than all the other parts of the body put together. Thoſe ſeparately can only ſhew ſome few paſſions, but the head expreſſes them all. Some, however, are more peculiarly expreſſed by it than others: as humility, by hanging it down; arrogance, by lifting it up; languiſhment, by inclining it on one ſide; and obſtinacy, when with a ſtiff and reſolute air it ſtands upright, fixed, and ſtiff between the two ſhoulders. The head alſo beſt ſhews our ſupplications, threats, mildneſs, pride, love, hatred, joy, and grief. The whole face, and every feature, contributes ſomething: eſpecially the eyes; which, as Cicero ſays, are the *windows of the ſoul.* The paſſions they more particularly diſcover are, pleaſure, languiſhing, ſcorn, ſeverity, mildneſs, admiration, and anger; to which one might add joy and grief, if they did not proceed more particularly from the eye-brows and mouth; but when thoſe two paſſions fall in alſo with the language of the eyes, the harmony will be wonderful. But though the paſſions of the ſoul are moſt viſible in the lines and features of the face, they often require the aſſiſtance alſo of the other parts of the body. Without the hands, for inſtance, all action is weak and imperfect; their motions, which are almoſt infinite, create numberleſs expreſſions: it is by them that we *deſire, hope, promiſe, call, ſend back;* they are the inſtruments of *threatening, prayer, horror,* and *praiſe;* by them we *approve, condemn, refuſe, admit, fear, aſk;* expreſs our *joy* and *grief,* our *doubts, regrets, pain,* and *admiration.* In a word, it may be ſaid, as they are the language of the dumb, that they contribute not a little to ſpeak a language common to all nations, which is the language of painting. But to ſay how theſe parts muſt be diſpoſed for expreſſing the various paſſions, is impoſſible; nor can any exact rules be given for it, both becauſe the taſk would be infinite, and becauſe every one muſt be guided in this by his own genius and the particular turn of his own ſtudies." See PAINTING, n° 15.

10. *On drawing Landſkips, Buildings, &c.* Of all the parts of drawing, this is the moſt uſeful and neceſſary, as it is what every man may have occaſion for at one time or another. To be able, on the ſpot, to take the ſketch of a fine building, or a beautiful proſpect; of any curious production of art, or uncommon appearance in nature; is not only a very deſirable accompliſhment, but a very agreeable amuſement. Rocks, mountains, fields, woods, rivers, cataracts, cities, towns, caſtles, houſes, fortifications, ruins, or whatſoever elſe may preſent itſelf to view on our journeys or travels in our own or foreign countries, may be thus brought home, and preſerved for our future uſe either in buſineſs or converſation. On this part, therefore, more than ordinary pains ſhould be beſtowed.

All drawing conſiſts in nicely meaſuring the diſtances of each part of the piece by the eye. In order to facilitate this, let the learner imagine in his own mind, that the piece he copies is divided into ſquares. For example: Suppoſe or imagine a perpendicular and a horizontal line croſſing each other in the centre of the picture you are drawing from; then ſuppoſe alſo two ſuch lines croſſing your own copy. Obſerve in the original, what parts of the deſign thoſe lines interſect, and let them fall on the ſame parts of the ſuppoſed lines in the copy: We ſay, the ſuppoſed lines; becauſe though engravers, and others who copy with great exactneſs, divide both the copy and original into many ſquares, as below: yet this is a method not to be recommended, as it will be apt to deceive the learner, who will fancy himſelf a tolerable proficient, till he comes to draw after nature, where theſe helps are not to be had, when he will find himſelf miſerably defective and utterly at a loſs.



If he is to draw a landſkip from nature, let him take his ſtation on a riſing ground, where he will have a large horizon; and mark his tablet into three diviſions, downwards from the top to the bottom; and divide in his own mind the landſkip he is to take, into three diviſions alſo. Then let him turn his face directly oppoſite to the midſt of the horizon, keeping his body fixed, and draw what is directly before his eyes upon the middle diviſion of the tablet; then turn his head, but not his body, to the left hand, and delineate what he views there, joining it properly to what he had done before; and, laſtly, do the ſame by what is to be ſeen upon his right hand, laying down every thing exactly both with reſpect to diſtance and proportion.

The beſt artiſts of late, in drawing their landſkips, make them ſhoot away one part lower than another. Thoſe who make their landſkips mount up higher and higher, as if they ſtood at the bottom of a hill to take the proſpect, commit a great error: the beſt way is to get upon a riſing ground, make the neareſt objects in the piece the higheſt, and thoſe that are farther off to ſhoot away lower and lower till they come almoſt level with the line of the horizon, leſſening every thing proportionably to its diſtance, and obſerving alſo to make the objects fainter and leſs diſtinct the farther they are removed from the eye. He muſt make all his lights and ſhades fall one way; and let every thing have its proper motion: as, Trees ſhaken by the wind, the ſmall boughs bending more, and the large ones leſs: water agitated by the wind, and daſhing againſt ſhips or boats; or falling from a precipice upon rocks and ſtones, and ſpirting up again into the air, and ſprinkling all about: clouds alſo in the air, now gathered with the winds; now violently condenſed into hail, rain, and the like: Always remembering, that whatever motions are cauſed by the wind muſt be made all to move the ſame way, becauſe the wind can blow but one way at once.

Finally, it muſt be obſerved, that in order to attain any conſiderable proficiency in drawing, a knowledge of PERSPECTIVE is abſolutely neceſſary; ſee that article.

DRAY, a kind of cart uſed by brewers, for carrying barrels of beer, or ale; alſo a ſledge drawn without wheels.

DRAY, among ſportſmen, denotes ſquirrel-neſts, built in the tops of trees.

DRAYTON (Michael), an eminent Engliſh poet, born of an ancient family in Warwickſhire in 1563. His propenſity to poetry was extremely ſtrong, even from his infancy; and we find the moſt of his principal poems publiſhed, and himſelf highly diſtinguiſhed as a poet, by the time he was about 30 years of age.—It appears from his poem of "Moſes's birth and miracles," that he was a ſpectator at Dover of the famous Spaniſh armada, and it is not improbable that he was engaged in ſome military employment there. It is certain, that not only for his merit as a writer, but his valuable qualities as a man, he was held in high eſtimation, and ſtrongly patronized by ſeveral perſonages of conſequence; particularly by Sir Henry Goodere, Sir Walter Aſton, and the Counteſs of Bedford; to the firſt of whom he owns himſelf indebted for great part of his education, and by the ſecond he was for many years ſupported.

His poems are very numerous; and ſo elegant, that his manner has been copied by many modern writers of eminence ſince. Among theſe the moſt celebrated one is the *Poly-Albion*, a chorographical deſcription of England, with its commodities, antiquities, and curioſities, in metre of 12 ſyllables; which he dedicated to prince Henry, by whoſe encouragement it was written: and whatever may be thought of the poetry, his deſcriptions are allowed to be exact. He was ſtyled *poet laureat* in his time: which, as Ben Johnſon was then in that office, is to be underſtood in a looſe ſenſe, of approbation as an excellent poet; and was beſtowed on others as well as Drayton, without being confined ſtrictly to the office known by that appellation. He died in 1631; and was buried in Weſtminſter abbey, among the poets, where his buſt is to be ſeen, with an epitaph penned by Ben Johnſon.

DREAMS; thoſe fancies or imaginations which occur to the minds of people when aſleep.

The ſubject of dreaming hath been inveſtigated by ſeveral philoſophers, but hitherto with very little ſucceſs.—Wolfius ſuppoſes that dreams take their riſe entirely from the ſenſations; and that no dream ariſes in the human mind without a previous ſenſation, though perhaps ſuch a ſlight one that it cannot eaſily be traced. This hypotheſis is expreſsly adopted by Mr Formey, in an eſſay on dreaming, in the Memoirs of the Academy of Sciences at Berlin.—Mr Baxter, in his treatiſe of the Immateriality of the human Soul, attributes dreams to the action of ſome immaterial beings upon our ſoul.—Laſtly, ſome modern phyſiologiſts reckon dreaming to be a ſpecies of *delirium*. Their account of the matter is as follows. The brain and nervous ſyſtem, which are the only organs of ſenſation, are generally in two ſtates, exceedingly different from one another, which may be expreſſed by the words *excitement* and *collapſe*. The firſt of theſe denotes that ſtate in which the nervous ſyſtem is eaſily made ſenſible of the impreſſions of external objects, and then we are ſaid to be awake. The ſecond is, when external objects do not eaſily make theſe impreſſions: and of this ſtate there are various degrees; drowſineſs, ſleep, fainting, and death. Theſe do not indeed proceed in the order in which we have placed them. Sleep is of a quite different nature from fainting, or from that ſtupor and inſenſibility produced by a compreſſion of the brain. But, whatever be the nature of ſleep, it is certain that this ſtate is attended with what we call a *collapſe* of the brain; as external objects do not make the ſame impreſſions on the organs of ſenſe when people are aſleep, that they do when awake. Between the two ſtates of ſleeping and waking, a ſtate of delirium always occurs; and this is moſt probably occaſioned by the excitement of one part of the brain, and the collapſe of another.—That one part of the brain is capable of being excited, while the other ſuffers a collapſe, will be evident from conſidering what happens when we are juſt falling aſleep. Every one muſt be ſenſible, that at that time we do not loſe our ſenſes all at once. The hearing will continue after the ſight is loſt; and, even while we are yet conſcious of the place we are in, falſe imaginations of a nature ſimilar to that of dreaming will occur to our minds. But when the brain is perfectly collapſed, ſenſation or imagination of every kind totally vaniſhes, and we are altogether inconſcious of exiſtence.

On a ſubject ſo obſcure, and ſo much out of the reach of inveſtigation, as that of dreaming, it is difficult to advance any thing ſatisfactory. All the abovementioned hypotheſes, however, ſeem to be exceedingly imperfect.—It may be granted Wolfius and Formey, that dreams will ariſe from certain impreſſions made either on the external or internal parts of the body. But theſe impreſſions by no means produce any thing like the ſenſations we have from ſimilar ones made upon us while we are awake. Thus, if a perſon whoſe digeſtion is not very good, goes ſoon to bed after eating a large ſupper, it is not improbable that he will dream of being oppreſſed with a great weight, by a monſter, being ſuffocated, &c. Theſe dreams undoubtedly ariſe from the uneaſy ſenſations produced in the ſtomach from too great a quantity of food; but if the perſon was awake, ſuch ſenſations would produce only a ſickneſs and uneaſineſs at ſtomach. If dreams, therefore, in all caſes, proceed from ſenſations, we muſt alſo ſay, that in ſleep the laws of ſenſation itſelf are altered; that thoſe connections which we look upon to be the moſt conſtant and invariable, are not ſo in reality; and thus we are led into a greater difficulty than before. For example, there is no ſenſation more invariable, than that, when a man's ſtomach is oppreſſed, he ſhould feel what we call *ſickneſs*. This ſenſation happening in the time of ſleep, according to Wolfius, produces a dream. Very true, it will do ſo; but why does not the man dream that he is ſick? What connection is there between *ſickneſs*, the waking ſenſation, and being oppreſſed by a weight, ſuffocated by a monſter, &c. the ſleeping ones?—This difficulty ſeems inſurmountable on the hypotheſis of Wolfius and Formey.

Mr Baxter's ſuppoſition is, in its very nature, *incapable* of proof. We are by no means aſcertained of the exiſtence of any immaterial beings, created ones at leaſt, that can have acceſs to our ſouls: and though we were, the ridiculous fancies that ſometimes occur in dreams are too abſurd to be ſuppoſed the work of any rational being; much leſs of thoſe who poſſeſs an higher rank in the creation than ourſelves.—It muſt alſo be obſerved, that the method which this author takes to prove his hypotheſis can never be concluſive, even though every thing he contends for ſhould be granted. He inſiſts that the phantaſm, or what is properly called the *viſion*, in dreams, is not the work of the ſoul itſelf, and cannot be the effect of mechanical cauſes; therefore, according to him, it muſt be the effect of *immechanical*, or *immaterial*, agents operating upon the ſoul.—That it is not the work of the ſoul itſelf, may readily be granted; and likewiſe that it is not the effect of ſuch mechanical cauſes as we are acquainted with: but from thence it will not follow, that it muſt neceſſarily be the effect of immaterial cauſes, unleſs we were perfectly well acquainted with the extent of all mechanical powers whatever. Nay, in many inſtances, ſuch as that above-mentioned, we are certain that dreams not only may be, but actually are, the effects of mechanical cauſes, though we ſhould never be able to inveſtigate them.

The third hypotheſis ſeems alſo inadequate to ſolve the phenomena of dreaming. If this depended on a partial excitement of the brain, our ideas ought to be juſt, as far as that excitement could reach. Thus, ſuppoſing that part of the brain on which ſight depends, to be quite collapſed; and that on which hearing depends, to be in ſome meaſure excited; the perſon, tho' deprived of ſight, would hear ſounds confuſedly: but ſtill they would only be ſuch ſounds as were actually produced by external objects; and no reaſon can be aſſigned why he ſhould imagine he heard ſounds which never exiſted.—Beſides, in dreaming, it is very manifeſt, that the excitement of the brain is not *partial*, but *falſe*. No perſon in his dreams imagines himſelf deaf, dumb, or blind. He imagines that he ſees, hears, walks, reaſons; nay, ſometimes that he ſleeps and dreams; which a partial excitation of the brain can never account for.

Before any thing can be conjectured with probability concerning the phenomena of dreaming, it is neceſſary to inveſtigate in ſome meaſure the nature of ſleep.—On this ſubject it may be obſerved, that by whatever means ſleep is produced, whether naturally by fatigue, artificially by compreſſing the brain, &c.; and however different theſe kinds of ſleep may be from one another, one general effect ſtill remains the ſame; namely, that the external ſenſes are aboliſhed, and the perſon becomes totally inconſcious of whatever paſſes around him. From this general effect, which in all caſes is conſtant and invariable, ſleep may be defined, "a ſtate in which all communication is cut off between our ſentient principle and this viſible world."—That the ſentient and vital principle hath its reſidence in the brain, is an opinion which in all ages hath been eſteemed very probable. If the compariſon can be allowed, it might here be ſaid, that the brain, with regard to ſenſation, hath the ſame relation to the nerves, that a pond or reſervoir of water hath to a number of ſmall ſtreams that flow into it and out from it.—In the brain there ſeems to be a kind of general repoſitory of ſome part of thoſe ſenſations we have formerly felt; but in what manner this repoſitory is formed, we know not. Certain it is, that there the ideas are treaſured up in ſuch a manner as to be at times, and indeed moſt commonly, imperceptible to ourſelves. Thus, there are many things we have done, many people we have been acquainted with, and many places we have been in, of which we are juſt now quite inſenſible, and will remain ſo till ſome circumſtance or other brings them to our remembrance. For example: Suppoſe a man has been intimately acquainted with two others who were companions, and lodged in the ſame houſe; he goes into another country, and being engaged in new purſuits, forgets both ſo completely, that for a conſiderable time he hath perhaps never thought of them at all. But if he ſhould unexpectedly meet with one of theſe friends in the ſtreet, he will inſtantly remember the other who is at a diſtance; and this very circumſtance will bring a train of thoughts into his mind, which produces the remembrance of many things that otherwiſe perhaps would never have been thought of. Now, if we conſider what paſſes with regard to our own minds and intellectual faculties, we ſhall readily be convinced, that every thing we do remember, occurs only in conſequence of ſome external circumſtance. If a perſon gave us a ſlight offence yeſterday, to-day perhaps we do not think of it, even though we ſee the perſon; but if he offends again, though in another manner, the offence of yeſterday inſtantly occurs to our minds. A thouſand other inſtances of the like kind might be adduced; ſo many indeed, that ſome have doubted whether we ever do forget any thing ſo completely that it could not be brought to our remembrance by a proper combination of external circumſtances.

The only things we can think of, are the preſent and the paſt. When we think of what is to come, we muſt combine ideas from the preſent and the paſt. If, therefore, our memory depends on a certain combination of external circumſtances immediately preſent to our view, it muſt neceſſarily follow, that the more a perſon is kept in perfect ſolitude, or removed from every thing that can affect his ſenſes, the more he will be inclined to ſleep. And, indeed, as far as this experiment can be tried, it will moſt commonly be found ſucceſsful. For, let a perſon who has ſlept his uſual time through the night be put to bed at noon-day, in a dark room, where there is nothing either to amuſe or diſturb him, and he will almoſt certainly fall aſleep in a ſhort time. Hence it would ſeem, that by whatever means our ſenſations of what is preſent, or our external ſenſes, are ſuſpended; by the ſame, our memory muſt alſo be extinguiſhed, and we become abſolutely inconſcious of exiſtence, or fall aſleep.

This ſtate of the body, therefore, may be produced in three different ways. 1. By a removal of all ſuch objects as by their appearance make a ſtrong impreſſion on the nervous ſyſtem. 2. By compreſſing or otherwiſe injuring the brain, ſo that the vital principle cannot receive the ſenſations from the nerves. 3. By injuring the extremities of the nerves in ſuch a manner, that they cannot receive any ſenſation from the impreſſion of external objects.

The firſt and the laſt of theſe are the common methods by which natural ſleep is produced. But, before we can fully inveſtigate our ſubject, another queſtion remains to be diſcuſſed; namely, From whence are the ſentient extremities of the nerves ſupplied with that fluid which is the immediate inſtrument of ſenſation?

Under the article Blood, it hath been ſhewn, that, in reſpiration, there is a certain quantity of a ſubtile fluid received from the air, which is abſolutely neceſſary to life. Of this fluid there is undoubtedly a conſiderable waſte ſomewhere or other; becauſe reſpiration cannot be interrupted even for a very ſhort time, without a total deſtruction of life. The arterial blood, which receives this ſubtile vivifying ſpirit, ſhews that it hath done ſo by its florid red colour, which diſtinguiſhes it from that of the veins. During the courſe of the circulation, that ſpirit, or whatever it is, which gives the arterial blood its florid colour, is diſſipated, and the blood returned by the veins makes a quite different appearance. It would ſeem probable, therefore, that this very volatile part is abſorbed by the nerves, which every where accompany the blood-veſſels.—If this is the caſe, we muſt eaſily ſee the reaſon why a ſtate of ſleep ſo readily follows immoderate fatigue, watching, &c.; namely, becauſe theſe things occaſion a conſtant drain of the vital principle from the blood, which at laſt becoming greater than the ſupply afforded by reſpiration, the blood becomes deprived of a part of that principle which ought to be retained in it, and which conſequently cannot be beſtowed on the nerves without great uneaſineſs and inconvenience. In ſuch caſes, therefore, unleſs the external impreſſions are very ſtrong, the abſorption of the vital principle by the nervous ſyſtem will not go on; and the conſequence of this muſt be, that the perſon will very ſoon fall aſleep, for the reaſons already given.—Hence we ſee, why any thing that impedes the circulation alſo produces a tendency to ſleep. Of this we have a remarkable inſtance in the effects of cold. The firſt ſymptom of death in thoſe who are about to periſh with cold, is a drowſineſs, which ſoon increaſes to ſuch a degree that it cannot be reſiſted. The perſon ſits down, as he imagines, to take a ſhort nap, but never awakes.—In the ſame way we may account for that kind of ſleep called *fainting*, which uſually follows exceſſive evacuations or fatigue of any kind. By theſe the circulation of the blood is diſturbed, or perhaps its quantity leſſened in ſuch a manner, that the extreme parts of the nerves cannot receive a ſufficient ſupply of vital fluid to enable them to perform their functions. The external ſenſes therefore ceaſe; and though former ſenſations remain in the memory, yet as no external circumſtance can be perceived, which only can call the memory into action, a ſtate of total inſenſibility generally enſues.

This hypotheſis proceeds upon a principle ſomewhat different from thoſe laid down by the generality of phyſiologiſts. Thoſe who allow the nervous fluid to be ſecreted from the blood by the brain, generally ſuppoſe that it is ſent out from thence to all parts of the body; but the idea that any quantity of the nervous or vital fluid is abſorbed from the blood by the extremities of the nerves, ſeems not to have occurred. It is certain, however, that we have the ſame evidence of this abſorption by the extremities of the nerves that there is of the ſecretion in the brain. The blood, on this ſuppoſition, contains the vital principle; but all the blood is not ſent to the brain. The greater part of it is ſent to other parts of the body. There doth not ſeem to be any eſſential difference between the blood brought back from the brain, and that returned by the veins from other parts of the body. Both of them have evidently ſuffered a loſs of their moſt ſubtile part. In the firſt it is not diſputed that the volatile part loſt by the blood is received by the brain; but what becomes of that which is loſt by the blood ſent to all the other parts of the body? We can here give no other anſwer, than that in all probability it is taken up by the extremities of the nerves, and ſupplies them with the powers neceſſary for ſenſation, and the regulation of the body. Hence we ſee the reaſon why depriving any part of the body, of the blood it contained, deprives it alſo of ſenſation; namely, becauſe there is then no ſource whence the extremities of the nerves can be ſupplied with the ſentient principle.

If what is now advanced can be admitted with any degree of probability, the explication of the phenomena of dreaming, as far as an explanation can reaſonably be expected, will not be difficult. According to this hypotheſis, as long as a certain motion is communicated, by the impreſſion of external objects, from the ſentient extremities of the nerves to the brain, ſo long we continue ſenſible of the exiſtence of the objects around us, or are ſaid to be *awake*. When, from a deficiency of the vital fluid in the extremities of the nerves, from a compreſſion of the brain, or from any other cauſe, the above-mentioned motion ceaſes, we are inſenſible of our exiſtence, and are ſaid to be *aſleep*. In ſleep therefore the nervous fluid, which lies between the extreme parts of the nerves and the brain, is either deficient in quantity, or remains at reſt, or its influx into the brain is interrupted. When we are awake, the communication is free, the fluid in ſufficient quantity, and liable to be ſet in motion by every ſlight impulſe. Of theſe impulſes therefore we are ſenſible, and our ſenſations are uniform and regular. When external objects ceaſe to be perceived, ſtill the nerves contain a quantity of the fluid we have mentioned, and which is very eaſily ſet in motion. If irregular motions happen

pen in it from any internal cauſe, the conſequence muſt be a multitude of confuſed and irregular ſenſations, which we call *dreaming*.

This may be illuſtrated by the following examples. There is no ſenſe we exerciſe ſo much as that of ſight; and it is the one of which we can moſt eaſily deprive ourſelves at pleaſure. By means of this ſenſe every perſon has it in his power to dream when he pleaſes; and to do ſo, he needs only to ſhut his eyes. No perſon can ſhut his eyes even for a few moments, but he will be ſenſible of a great number of faint confuſed images preſenting themſelves before him; and theſe he cannot poſſibly remove, till he opens his eyes, or falls aſleep altogether. It can ſcarce be doubted, that theſe images are occaſioned by the great mobility and ſubtilty of the fluid contained in the optic nerve. Though the regular motion produced in it by the impulſe of the light ceaſes when the eye-lids are ſhut, yet an irregular one continues from ſome internal cauſes, and this motion occaſions the confuſed ſenſation already mentioned. The appearance of ſuch images we do not indeed in the preſent inſtance call *dreams*, becauſe our other ſenſes are awake; but if theſe individual ſenſations were to occur while we were aſleep, undoubtedly they would be called by that name; and from what is already obſerved, they ſeem plainly to be of the ſame nature in both caſes.

With regard to the other ſenſes, it is not in our power to hinder the operation of external objects upon them, as we can do with our ſight; but there is no reaſon to ſuppoſe that dreams might not be produced by them in the very ſame manner that they are by our faculty of viſion, provided we could as eaſily ſuſpend the operation of external objects upon them.—We have an evidence of the truth of this ſuppoſition in the caſe of fainting; which is generally preceded by a noiſe in the ears. In many diſeaſes alſo, particularly nervous ones, the *tinnitus aurium*, or noiſe in the ears, is a very troubleſome ſymptom.

The ſenſe of feeling is leſs liable to deception while we are awake than any of the reſt; nevertheleſs there is one caſe which may be referred to that of dreaming, and which has been very often taken notice of. It is an imagination common to people who have loſt a limb, that they ſtill feel a pain in it, though many years after it has been ſeparated from their body. If this imagination occurred only in the time of ſleep, we would have no heſitation in calling it a dream; but as it occurs while the perſons are awake, it hath been explained without thinking of any connection between it and the phenomenon of dreaming. It is certain, however, that whatever explains the one, will explain the other alſo. In the caſe of the amputated limb, the ſenſation ariſes from ſome injury offered to the nerve which had formerly gone to that limb. This produces a certain motion in the nervous fluid, that is propagated along the nerves to the brain, upon which the imagination that the limb ſtill remains immediately takes place. In like manner, if, during the time of ſleep, a ſimilar motion ſhall occur, a ſimilar imagination or dream will be the conſequence.—It muſt be obſerved, however, that, in dreaming, our ſenſe of feeling is much more obſcure than thoſe of ſeeing and hearing. We dream that we ſee objects and hear ſounds pretty diſtinctly; while we ſcarce *feel* any thing we imagine ourſelves to touch, or carry in our hands; and as for the ſenſes of taſte and ſmell, they are ſcarce ever exerciſed in dreaming.

Dreams have in all ages been reckoned by the vulgar to have ſomething portentous in them, and to preſage future events. Indeed, there are few things about which the ſuperſtition of mankind hath more exerciſed itſelf than the interpretation of dreams. If the abovementioned ſolution of this phenomenon is allowed, it may readily be granted, that dreams may preſage diſeaſes, or changes of the weather, becauſe the nervous ſyſtem is very apt to be influenced by alterations in our atmoſphere; and no alteration in our health can poſſibly take place without producing ſome change in the nervous ſyſtem. But how they can preſage events entirely unconnected with our bodies, doth not appear; or rather it appears very plain that naturally they cannot; though the ſacred writers give us many inſtances of the knowledge of future events being conveyed to mankind in dreams, by a ſupernatural influence. From the ſolution of this phenomenon we have juſt now given, it appears, how imaginations reſembling dreams may occur as well when we are awake as when we are aſleep; and that they actually do ſo, we have many melancholy inſtances in hypochondriac and mad people.

DRELINCOURT (Charles), miniſter of the reformed church at Paris, was born at Sedan, in 1595, where his father enjoyed a conſiderable poſt, He had all the qualifications that compoſe a reſpectable clergyman; and though he defended the Proteſtant cauſe againſt the Romiſh religion, was much eſteemed even among the Catholics. He is beſt known in England by his *Conſolations againſt the fears of death*, which work was tranſlated, and is often printed. He married the daughter of a rich merchant at Paris, by whom he had 16 children; his third ſon, profeſſor of phyſic at Leyden, was phyſician to the prince and princeſs of Orange, before their acceſſion to the crown of England: Bayle has given him a high character. Mr Drelincourt died in 1660.

DRENCH, among farriers, a phyſical potion for horſes. The ingredients for this purpoſe are to be beat coarſely, and either mingled with a decoction, or with wine. Then let all infuſe about a quarter of an hour; and give it to the horſe with a horn, after he has been tied up two hours to the rack.

DRESDEN, the capital city of the electorate of Saxony, in Germany. It is ſeated on the river Elbe, which divides it into two parts. One part is called *Old Dreſden*, and the other the *New Town*, in the German language, *New Stadt*. They are joined together by a ſtone bridge, ſupported by 19 piers, and 630 paces in length. As this bridge was too narrow for the crowds of people that were continually paſſing and repaſſing, king Auguſtus, in 1730, cauſed two walks for foot-paſſengers to be built, one on each ſide, in a very wonderful manner, the one for thoſe that go into the city, and the other for thoſe that return back. Theſe are bordered with iron palliſadoes, of curious workmanſhip. Upon this bridge a gilded crucifix is placed. Dreſden is ſurrounded by ſtrong and handſome fortifications; and might boaſt that it never had been taken, nor yet beſieged: but this glory was put to an end on December 19. 1745, by the king of Pruſſia;

who then became maſter of it, and entered it in triumph the next day.

All the houſes of this city are built with ſquare free ſtone, and are almoſt all of the ſame height. They have ſtone from the neighbourhood of Pirna, about 10 miles from this city, which is readily brought down the Elbe. They have lately finiſhed a large handſome church for the Roman Catholics, which is placed between the Elbe, the bridge, and the caſtle. In general the houſes are high and ſtrong; the ſtreets wide, ſtraight, well paved, clean, and well illuminated in the night; and there are large ſquares, diſpoſed in ſuch a manner, that Dreſden may paſs for one of the handſomeſt cities in the world.

Though this city lies in a low ſituation, yet it hath agreeable proſpects. It is ſupplied with a prodigious quantity of proviſions, not only out of the neighbourhood, but from Bohemia, which are brought every market-day, which is once a-week. The Dreſden china-ware, or rather porcelain, has been noted ſome time for a curious manufacture. E. Long. 13. 34. N. Lat. 51. 12.

DRESSING of HEMP and *Flax*. See FLAX-*Dreſſing*.

DRESSING *of Meats*, the preparing them for food, by means of culinary fire.

The deſign of dreſſing, is to looſen the compages or texture of the fleſh, and diſpoſe it for diſſolution and digeſtion in the ſtomach. Fleſh not being a proper food without dreſſing, is alleged as an argument that man was not intended by nature for a carnivorous animal.

The uſual operations are roaſting, boiling, and ſtewing.—In roaſting, it is obſerved, meat will bear a much greater and longer heat than either in boiling or ſtewing; and in boiling, greater and longer than in ſtewing. The reaſon is, that roaſting being performed in the open air, as the parts begin externally to warm, they extend and dilate, and ſo gradually let out part of the rarified included air, by which means the internal ſuccuſſions, on which the diſſolution depends, are much weakened and abated. Boiling being performed in water, the preſſure is greater, and conſequently the ſuccuſſions to lift up the weight are proportionably ſtrong; by which means the coction is haſtened: and even in this way there are great differences; for the greater the weight of water, the ſooner is the buſineſs done.

In ſtewing, though the heat be infinitely ſhort of what is employed in the other ways, the operation is much more quick, becauſe performed in a cloſe veſſel, and full; by which means the ſuccuſſions are oftener repeated, and more ſtrongly reverberated. Hence the force of Papin's digeſtor; and hence an illuſtration of the operation of digeſtion.

Boiling, Dr Cheyne obſerves, draws more of the rank, ſtrong juices from meat, and leaves it leſs nutritive, more diluted, lighter, and eaſier of digeſtion: roaſting, on the other hand, leaves it fuller of the ſtrong nutritive juices, harder to digeſt, and needing more dilution. Strong, grown, and adult animal food, therefore, ſhould be boiled; and the younger, and tenderer, roaſted.

DRESSING, in ſurgery, the treatment of a wound, or any diſordered part. The apparatus of dreſſing conſiſts of doſſils, tents, plaſters, compreſſes, bandages, bands, ligatures, and ſtrings. See SURGERY.

DREXELIUS (Jeremiah), a Jeſuit celebrated for his piety and writings, was born at Auſburg, and became preacher in ordinary to the elector of Bavaria. He wrote ſeveral pious and practical pieces, which have been printed together in two volumes folio; and died in 1638.

DREVET (Peter), an eminent French engraver, was a member of the royal academy of painting and ſculpture; and died at Paris in 1739, at 42 years of age. His portraits are neat and elegant; but laboured to the laſt degree. They are copied from Rigaud and other French maſters; and abound in all that flutter and licentious drapery ſo oppoſite to the ſimple and chaſte ideas of true taſte. He chiefly excels in copying Rigaud's frippery, lace, ſilk, fur, velvet, and other ornamental parts of dreſs.—His father was excellent in the ſame art.

DREUX, a town in the Iſle of France, remarkable for its antiquities; and for the battle which was fought in December 1562, between the Papiſts and the Proteſtants, wherein the former gained the victory. Some think it took its name from the prieſts of Gaul, called the *Druids*, in the times of Paganiſm. It conſiſts of two pariſhes, St Stephen's and Notre Dame, called the *great church*, which is pretty well built. It is ſeated on the river Blaiſe, at the foot of a mountain, on which is a ruined caſtle. E. Long. 1. 27. N. Lat. 48. 44.

DRIFT, in navigation, the angle which the line of a ſhip's motion makes with the neareſt meridian, when ſhe drives with her ſide to the wind and waves, and is not governed by the power of the helm: it alſo implies the diſtance which the ſhip drives on that line.

A ſhip's way is only called *drift* in a ſtorm; and then, when it blows ſo vehemently as to prevent her from carrying any ſail, or at leaſt reſtrains her to ſuch a portion of ſail as may be neceſſary to keep her ſufficiently inclined to one ſide, that ſhe may not be diſmaſted by her violent labouring produced by the turbulence of the ſea.

DRIFT, in mining, a paſſage cut out under the earth betwixt ſhaft and ſhaft, or turn and turn; or a paſſage or way wrought under the earth to the end of a meer of ground, or part of a meer.

DRIFT-*Sail*, a ſail uſed under water, veered out right a-head by ſheets, as other ſails are. It ſerves to keep the ſhip's head right upon the ſea in a ſtorm, and to hinder her driving too faſt in a current.

DRILL, in mechanics, a ſmall inſtrument for making ſuch holes as punches will not conveniently ſerve for. Drills are of various ſizes, and are chiefly uſed by ſmiths and turners.

DRILL, or *Drill-Box*, a name given to an inſtrument for ſowing land in the new method of horſe-hoeing huſbandry. See AGRICULTURE.

DRILL-*Sowing*, a method of ſowing grain or ſeed of any kind, ſo that it may all be at a proper depth in the earth, which is neceſſary to its producing healthful and vigorous plants. For this purpoſe a variety of drill-ploughs have been invented and recommended; but from the expence attending the purchaſe, and the extreme complication of their ſtructure, there is not an inſtrument of that kind, as yet diſcovered, that is likely to be brought into general uſe. This method, however, is greatly recommended in the Georgical Eſſays, where we have the following obſervations and experiments.—“ Grain ſown by the hand, and covered by the harrows, is placed at unequal depths; the ſeeds conſequently ſprout at different times, and produce an unequal crop. When barley is ſown late, and a drought ſucceeds, the grain that was buried in the moiſture of the earth ſoon appears, while ſuch as was left near the ſurface lies baking in the heat of the ſun, and does not vegetate till plentiful rains have moiſtened the ſoil. Hence an inequality of the crop, an accident to which barley is particularly liable. The ſame obſervation, but in a more ſtriking manner, may be made upon the ſowing of turnips. It frequently happens that the huſbandman is obliged to ſow his ſeed in very dry weather, in hopes that rain will ſoon follow; and either rolls or covers it with a buſh-harrow. We will ſuppoſe, that, contrary to his expectations, the dry weather continues. The ſeed, being near the ſurface, cannot ſprout without rain. The huſbandman is mortified at his diſappointment, but is ſoon ſatisfied and made eaſy by a perfect acquieſcence in what he thinks is the will of Providence. The ſcourge that he feels muſt not be placed to the diſpenſation of Providence, but has its ſource in the ignorance of the man himſelf. Had he judiciouſly buried the ſeed in the moiſt part of the ſoil with the drill-plough, or harrowed it well with the common harrow, his ſeed would have vegetated in due ſeaſon, and bountifully repaid him for his toil.

“ In the year 1769, a 15 acre cloſe was prepared for turnips. The land was in fine condition as to lightneſs, and had been well manured. On the 24th of June, 14 acres were ſown with turnip-ſeed broad-caſt, and harrowed in with a buſh-harrow. The remaining acre was ſowed the ſame day with the drill-plough, allowing 14 inches between the rows, and the ſhares being ſet near two inches deep. At the time of ſowing, the land was extremely dry, and the drought continued from the time of ſowing to the 5th of July; ſo that the broad-caſt did not make its appearance till about the 8th of that month, at which time the drill turnips were in rough leaf, having appeared upon the ſurface the ſixth day after ſowing.

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who then became maſter of it, and entered it in triumph the next day.

All the houſes of this city are built with ſquare free ſtone, and are almoſt all of the ſame height. They have ſtone from the neighbourhood of Pirna, about 10 miles from this city, which is readily brought down the Elbe. They have lately finiſhed a large handſome church for the Roman Catholics, which is placed between the Elbe, the bridge, and the caſtle. In general the houſes are high and ſtrong; the ſtreets wide, ſtraight, well paved, clean, and well illuminated in the night; and there are large ſquares, diſpoſed in ſuch a manner, that Dreſden may paſs for one of the handſomeſt cities in the world.

Though this city lies in a low ſituation, yet it hath agreeable proſpects. It is ſupplied with a prodigious quantity of proviſions, not only out of the neighbourhood, but from Bohemia, which are brought every market-day, which is once a-week. The Dreſden china-ware, or rather porcelain, has been noted ſome time for a curious manufacture. E. Long. 13. 34. N. Lat. 51. 12.

DRESSING of Hemp and *Flax*. See Flax-*Dreſſing*.

Dreſſing *of Meats*, the preparing them for food, by means of culinary fire.

The deſign of dreſſing, is to looſen the compages or texture of the fleſh, and diſpoſe it for diſſolution and digeſtion in the ſtomach. Fleſh not being a proper food without dreſſing, is alleged as an argument that man was not intended by nature for a carnivorous animal.

The uſual operations are roaſting, boiling, and ſtewing.—In roaſting, it is obſerved, meat will bear a much greater and longer heat than either in boiling or ſtewing; and in boiling, greater and longer than in ſtewing. The reaſon is, that roaſting being performed in the open air, as the parts begin externally to warm, they extend and dilate, and ſo gradually let out part of the rarified included air, by which means the internal ſuccuſſions, on which the diſſolution depends, are much weakened and abated. Boiling being performed in water, the preſſure is greater, and conſequently the ſuccuſſions to lift up the weight are proportionably ſtrong; by which means the coction is haſtened: and even in this way there are great differences; for the greater the weight of water, the ſooner is the buſineſs done.

In ſtewing, though the heat be infinitely ſhort of what is employed in the other ways, the operation is much more quick, becauſe performed in a cloſe veſſel, and full; by which means the ſuccuſſions are oftener repeated, and more ſtrongly reverberated. Hence the force of Papin's digeſtor; and hence an illuſtration of the operation of digeſtion.

Boiling, Dr Cheyne obſerves, draws more of the rank, ſtrong juices from meat, and leaves it leſs nutritive, more diluted, lighter, and eaſier of digeſtion: roaſting, on the other hand, leaves it fuller of the ſtrong nutritive juices, harder to digeſt, and needing more dilution. Strong, grown, and adult animal food, therefore, ſhould be boiled; and the younger, and tenderer, roaſted.

Dreſſing, in ſurgery, the treatment of a wound, or any diſordered part. The apparatus of dreſſing conſiſts of doſſils, tents, plaſters, compreſſes, bandages, bands, ligatures, and ſtrings. See Surgery.

DREXELIUS (Jeremiah), a Jeſuit celebrated for his piety and writings, was born at Auſburg, and became preacher in ordinary to the elector of Bavaria. He wrote ſeveral pious and practical pieces, which have been printed together in two volumes folio; and died in 1638.

DREVET (Peter), an eminent French engraver, was a member of the royal academy of painting and ſculpture; and died at Paris in 1739, at 42 years of age. His portraits are neat and elegant; but laboured to the laſt degree. They are copied from Rigaud and other French maſters; and abound in all that flutter and licentious drapery ſo oppoſite to the ſimple and chaſte ideas of true taſte. He chiefly excells in copying Rigaud's frippery, lace, ſilk, fur, velvet, and other ornamental parts of dreſs.—His father was excellent in the ſame art.

DREUX, a town in the Iſle of France, remarkable for its antiquities; and for the battle which was fought in December 1562, between the Papiſts and the Proteſtants, wherein the former gained the victory. Some think it took its name from the prieſts of Gaul, called the *Druids*, in the times of Paganiſm. It conſiſts of two pariſhes, St Stephen's and Notre Dame, called the *great church*, which is pretty well built. It is ſeated on the river Blaiſe, at the foot of a mountain, on which is a ruined caſtle. E. Long. 1. 27. N. Lat. 48. 44.

DRIFT, in navigation, the angle which the line of a ſhip's motion makes with the neareſt meridian, when ſhe drives with her ſide to the wind and waves, and is not governed by the power of the helm: it alſo implies the diſtance which the ſhip drives on that line.

A ſhip's way is only called *drift* in a ſtorm; and then, when it blows ſo vehemently as to prevent her from carrying any ſail, or at leaſt reſtrains her to ſuch a portion of ſail as may be neceſſary to keep her ſufficiently inclined to one ſide, that ſhe may not be diſmaſted by her violent labouring produced by the turbulence of the ſea.

Drift, in mining, a paſſage cut out under the earth betwixt ſhaft and ſhaft, or turn and turn; or a paſſage or way wrought under the earth to the end of a meer of ground, or part of a meer.

Drift-*Sail*, a ſail uſed under water, veered out right a-head by ſheets, as other ſails are. It ſerves to keep the ſhip's head right upon the ſea in a ſtorm, and to hinder her driving too faſt in a current.

DRILL, in mechanics, a ſmall inſtrument for making ſuch holes as punches will not conveniently ſerve for. Drills are of various ſizes, and are chiefly uſed by ſmiths and turners.

Drill, or *Drill-Box*, a name given to an inſtrument for ſowing land in the new method of horſe-hoeing huſbandry. See Agriculture.

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drink contributes to ſanguification, as ſometimes food gives too denſe a nutriment to be acted upon by the ſolids; and hence alſo we can ſee how drink promotes the ſecretions. Theſe are the effects of drink in general: but what has been ſaid muſt be taken with ſome limitations; for the more liquid the food, it is ſooner evacuated, and leſs nouriſhment is extracted. Hence drink is, in ſome degree, oppoſed to nouriſhment; and ſo, *cæteris paribus*, thoſe who uſe leaſt drink are moſt nouriſhed.

All the effects of drink above mentioned are produced by ſimple water; and it may be ſaid, that other liquors are fit for drink in proportion to the water they contain. Water, when uſed as drink, is often impregnated with vegetable and farinaceous ſubſtances; but, as drinks, theſe impregnations are of little conſequence: they add, indeed, a little nouriſhment; but this is not to be regarded in a healthy ſtate. Sometimes we impregnate water with the *fructus acido-dulces*; and then, indeed, it acquires other qualities, of conſiderable uſe in the animal œconomy. All drinks, however, may be reduced to two heads: firſt, pure water, or where the additional ſubſtance gives no additional virtue; ſecondly, the *fermentatæ*. Of the firſt we have already ſpoken; and the latter have not only the qualities of the firſt, but alſo qualities peculiar to themſelves.

Fermented liquors are more or leſs poignant to the taſte, and better calculated to quench thirſt. Thirſt may be owing to various cauſes: firſt, to defect of fluid in the ſyſtem, which occaſions a ſcanty ſecretion in the mouth, fauces, and ſtomach; the dryneſs of the mouth and fauces will alſo in this caſe be increaſed, by their continual expoſure to the perpetual flux and reflux of the evaporating air. Secondly, thirſt depends on a large proportion of ſolid viſcid food: thirdly, on an alkaleſcent aliment, eſpecially if it has attained any thing of the putrefactive taint: fourthly, on the heat of the ſyſtem; but this ſeems to operate in the ſame manner as the firſt cauſe, giving a ſenſe of dryneſs from its diſſipation of the fluids. The fermented liquors are peculiarly adapted for obviating all theſe cauſes; ſtimulating the mouth, fauces, and ſtomach, to throw out the ſaliva and gaſtric liquor by their poignancy: by their aceſcency they are fitted to deſtroy alkaleſcent acrimony, to quench thirſt from that cauſe: by their fluidity they dilute viſcid food; though here, indeed, they anſwer no better than common water. In two ways they promote the evacuation by ſtool, and progreſs through the inteſtines: firſt, by their fluidity and bulk; ſecondly, by their aceſcency, which, uniting with the bile, forms the peculiar ſtimulus formerly mentioned. Carried into the blood-veſſels, in ſo far as they retain any of the ſaline nature, they ſtimulate the excretories, and promote urine and ſweat; correcting thus alkaleſcency, not only by mixture, but diſſipation of the degenerated fluids.

Many phyſicians, in treating of fermented liquors, have only mentioned theſe qualities, rejecting their nutritious virtue, which certainly ought to be taken in; though by expediting the evacuation by ſtool they make leſs of the nutritious parts of the aliment to be taken up, and by ſtimulating the excretories make theſe nutritious parts to be for a ſhorter time in the ſyſtem. All theſe, and many more effects, ariſe from fermented liquors. Their aceſcency ſometimes promotes the diſeaſe of aceſcency, by increaſing that of vegetables, acting as a ferment, and ſo producing flatulency, purging, cholera, &c: ſo that, with vegetable aliment, as little drink is neceſſary, the moſt innocent is pure water; and it is only with animal food that fermented liquors are neceſſary. In warmer climates, *fermentatæ* would ſeem neceſſary to obviate alkaleſcency and heat. But it ſhould be conſidered, that though fermented liquors contain an acid, yet they alſo contain alcohol; which, though it adds ſtimulus to the ſtomach, yet is extremely hurtful in the warmer climates, and wherever alkaleſcency prevails in the ſyſtem. Nature, in theſe climates, has given men an appetite for water impregnated with acid fruits, *e. g.* ſherbet; but the uſe of this needs caution, as in theſe countries they are apt to ſhun animal food, uſing too much of the vegetable, and often thus cauſing dangerous refrigerations, choleras, diarrhœas, &c.

Of varieties of fermented liquors. We ſhall only mention here the chief heads on which theſe varieties depend. Firſt, they are owing to the quality of the ſubject, as more or leſs viſcid; and to its capacity alſo of undergoing an active fermentation, although perhaps the more viſcid be more nutritious. Hence the difference between ales and wines; by the firſt meaning fermented liquors from *farinacea*, by the ſecond from the fruits of plants. It depends, ſecondly, on the acerbity, acidity, nature, and maturation, of the fruit. Thirdly, the variety depends on the conduct of the fermentation. In general, fermentation is progreſſive, being at firſt active and rapid, detaching the fixed air or *gas ſylveſtre*, at the ſame time acquiring more acid than before. Theſe qualities of flatulency and acidity remain for ſome time; but as the fermentation goes on, the liquor becomes more perfect, no air is detached, and alcohol is produced; ſo that fermented liquors differ according to the progreſs of the fermentation, and have different effects on the ſyſtem. When fermentation is ſtopped before it comes to maturity, though naturally it proceeds in this way, yet by addition of new ferment it may again be renewed with a turbid inteſtine motion.

DRIVERS, among ſportſmen, a machine for driving pheaſant-powts, conſiſting of good ſtrong ozier wands, ſuch as the baſket-makers uſe; theſe are to be ſet in a handle, and twiſted or bound with ſmall oziers in two or three places. With this inſtrument the ſportſman drives whole eyes of young powts into his nets. See the next article.

DRIVING, among ſportſmen, a method of taking pheaſant powts. It is thus: The ſportſman finds out the haunts of theſe birds; and having fixed his nets there, he calls upon them together by a pheaſant-call, imitating the voice of the dam; after this he makes a noiſe with his driver, which will make them run a little way forward in a cluſter; and this he is to repeat till he has made ſure of them, which an expert ſportſman never fails to do, by driving them into his nets.

Driving, in metallurgy, is ſaid of ſilver, when, in the operation of refining, the lead being burnt away, the remaining copper riſes upon its ſurface in red fiery bubbles.

Driving, in the ſea-language, is ſaid of a ſhip, when an anchor being let fall will not hold her faſt, nor prevent her ſailing away with the wind or tide. The beſt help in this caſe is to let fall more anchors, or to veer out more cable; for the more cable ſhe has out, the ſafer ſhe rides. When a ſhip is a-hull, or a-try, they ſay, ſhe drives to leeward.

DROGHEDA, by the Engliſh called *Tredah*, a town of Ireland, in the province of Leinſter and county of Lowth, and ſituated on a bay of the ſame name, in W. Long. 6. 17. N. Lat. 53. 45. It was formerly very remarkable for its ſituation and ſtrength. In conſequence of this it was much diſtinguiſhed by the old Engliſh monarchs. Edward II. granted it a market and fair; and to theſe were added other great privileges in ſucceeding ages, particularly the right of coinage. It was bravely defended againſt the rebels in 1641. After the ceſſation of arms it was taken by the duke of Ormond and the earl of Inchiquin; but was retaken by Cromwell in 1649. At this time it ſuffered ſo much, that for a long time after it remained almoſt in ruins. The buildings were exceedingly ſhattered; and the town being taken by ſtorm, not only the garriſon, but the inhabitants, men, women, and children, were moſtly put to the ſword. By degrees, however, it recovered, and is at preſent a large and populous place. It is a town and county; and as ſuch ſends two repreſentatives to parliament. It has a great ſhare of inland trade, and an advantageous commerce with England: and tho' the port is but indifferent, and narrow at its entrance, with a bar, over which ſhips of burden cannot paſs but at high water, yet a great deal of buſineſs is done; ſo that, from a low and declining port, it is now become rich and thriving.

Drogheda is perhaps one of the ſtrongeſt inſtances that can be mentioned of the ineſtimable benefit of a river in any degree navigable: for though the Boyne is not capable of carrying veſſels bigger than barges, or pretty large boats, yet the conveniency that this affords of conveying coals by water-carriage through a great extent of country, introduced a correſpondence between this place and Whitehaven in Cumberland, to which the revival of its commerce has been in a great meaſure owing.

DROITWITCH, a town of Worceſterſhire in England, noted for excellent white ſalt made from the ſalt ſprings in its neighbourhood. W. Long. 2. 16. N. Lat. 52. 20.

DROMEDARY. See CAMELUS.

DRONE, in the hiſtory of inſects, a kind of male bee, larger than the common working or honey-bees: it is ſo called from its idleneſs, as never going abroad to collect either honey or wax. See APIS and BEE.

DRONE-*Fly*, a two-winged inſect, extremely like the common drone-bee, whence alſo the name.

DROPS, in meteorology, ſmall ſpherical bodies which the particles of fluids ſpontaneouſly form themſelves into when let fall from any height. This ſpherical figure, the Newtonian philoſophers demonſtrate to be the effect of corpuſcular attraction; for conſidering that the attractive force of one ſingle particle of a fluid is equally exerted to an equal diſtance, it muſt follow that other fluid particles are on every ſide drawn to it, and will therefore take their places at an equal diſtance from it, and conſequently form a round ſuperficies. See the articles ATTRACTION, FLUID, and RAIN.

DROPS, in medicine, a liquid remedy, the doſe of which is eſtimated by a certain number of drops.

Engliſh DROPS, *Guttæ Anglicanæ*, a name given to a chemical preparation eſteemed of great virtue againſt vapours and lethargic affections, and purchaſed at 5000l. by king Charles II. from the inventor Dr Goddard. The medicine appeared to be only a ſpirit drawn by the retort from raw ſilk, and afterwards rectified with oil of cinnamon, or any other eſſential oil; and was in reality no better than the common ſal volatile oleoſum, or any of the volatile ſpirits impregnated with an eſſential oil, except that it was leſs diſagreeable than any of them to the taſte.

Palſy DROPS. See PHARMACY, n° 443.

DROPS *of Life*. Ibid, n° 575.

DROPSY, in medicine, an unnatural collection of water in any part of the body. See (the *Index* ſubjoined to) MEDICINE.

DROPWORT, in botany. See FILIPENDULA.

Water DROPWORT, in botany. See OENANTHES.

DROSERA, ROS SOLIS, or *Sun-Dew*, in botany; a genus of the pentagynia order, belonging to the pentandria claſs of plants. There are three ſpecies, which grow naturally in boggy places in many parts of the kingdom. They ſeem to receive the name of *ſun-dew* from a very ſtriking circumſtance in their appearance. The leaves, which are circular, are fringed with hairs ſupporting ſmall drops or globules of a pellucid liquor like dew, which continue even in the hotteſt part of the day and in the fulleſt expoſure to the ſun. The whole plant is acrid, and ſufficiently cauſtic to erode the ſkin: but ſome ladies know how to mix the juice with milk, ſo as to make it an innocent and ſafe application to remove freckles and ſun-burn. The juice that exſudes from it unmixed, will deſtroy warts and corns. The plant hath the ſame effect upon milk that the common butterwort hath; and like that too is ſuppoſed to occaſion the rot in ſheep.

DROWNING, ſignifies the extinction of life by a total immerſion in water.

In ſome reſpects, there ſeems to be a great ſimilarity between the death occaſioned by immerſion in water, and that by ſtrangulation, ſuffocation by fixed air, apoplexies, epilepſies, ſudden faintings, violent ſhocks of electricity, or even violent falls and bruiſes. Phyſicians, however, are not agreed with regard to the nature of the injury done to the animal ſyſtem in any or all of theſe accidents. It is indeed certain, that in all the caſes above-mentioned, particularly in drowning, there is very often ſuch a ſuſpenſion of the vital powers as to us hath the appearance of a total extinction of them; while yet they may be again ſet in motion, and the perſon reſtored to life, after a much longer ſubmerſion than hath been generally thought capable of producing abſolute death. It were to be wiſhed, however, that as it is now univerſally allowed, that drowning is only a *ſuſpenſion* of the action of the vital powers, phyſicians could as unanimouſly determine the *means* by which theſe powers are ſuſpended; becauſe on a knowledge of theſe means, the methods to be uſed for recovering drowned perſons muſt certainly depend.

Dr de Haen, who hath written a treatiſe on this ſubject, aſcribes this diverſity of opinion among the phyſicians to their being ſo ready to draw general concluſions from a few experiments. Some, having never found water in the lungs, have thought that it never was there; and others, from its preſence, have drawn a contrary concluſion. Some have aſcribed the death which happens in caſes of drowning, to that ſpecies of apoplexy which ariſes from a great fullneſs of the ſtomach. But this opinion our author rejects, becauſe in 13 dogs which he had drowned and afterwards diſſected, no ſigns of ſuch a fulneſs appeared. Another reaſon is drawn from the want of the common marks of apoplexy on the diſſection of the brain; and from the actual preſence of water in the lungs. He is of opinion, that the death of drowned perſons happens in conſequence of water getting into the lungs, and ſtopping the blood in the arteries. He then diſcuſſes the queſtion how far the blowing of air into the lungs is uſeful in recovering drowned people. If their death is to be aſcribed to the water entering the lungs, this practice, he obſerves, muſt be hurtful, as it will increaſe the preſſure on the blood-veſſels, or may even force the water into them; which, on the authority of Lewis's experiments, he alleges is poſſible. But, in ſpite of this reaſoning, he aſſerts, that from experience it has been found uſeful. He allows, that the practice of ſuſpending drowned people by the feet muſt be hurtful, by determining the blood too much to the head; but he obſerves, that remedies in ſome reſpects hurtful may be uſed when the advantages derived from them preponderate; and is of opinion, that the practice above-mentioned may be uſeful by agitating the viſcera againſt each other, and thus renewing their motions. Cutting the larynx in order to admit air more freely to the lungs, he reckons to be of little or no uſe; but acknowledges, however, that it may ſometimes prove beneficial on account of the irritation occaſioned by the operation.

Dr Cullen, in his Letter to Lord Cathcart concerning the recovery of perſons drowned and ſeemingly dead, tells us, that "From the diſſection of drowned men, and other animals, it is known, that very often the water does not enter into the cavity of the lungs, nor even into the ſtomach, in any quantity to do hurt to the ſyſtem; and, in general, it is known, that, in moſt caſes, no hurt is done to the organiſation of the vital parts. It is therefore probable, that the death which enſues, or ſeems to enſue, in drowned perſons, is owing to the ſtoppage of reſpiration, and to the ceaſing, in conſequence, of the circulation of the blood, whereby the body loſes its heat, and, with that, the activity of the vital principle."

In the Phil. Tranſ. Vol. LXVI. Mr Hunter gives the following theory. The loſs of motion in drowning, ſeems to ariſe from the loſs of reſpiration; and the immediate effect this has upon the other vital motions of the animal, at leaſt this privation of breathing, appears to be the firſt cauſe of the heart's motion ceaſing. It is moſt probable therefore, Mr Hunter obſerves, that the reſtoration of breathing is all that is neceſſary to reſtore the heart's motion; for if a ſufficiency of life ſtill remains to produce that effect, we may ſuppoſe every part equally ready to move the very inſtant in which the action of the heart takes place, their actions depending ſo much upon it. What makes it very probable, that the principal effect depends upon throwing air into the lungs, is, that children in the birth, when too much time has been ſpent after the loſs of that life which is peculiar to the fetus, loſe altogether the diſpoſition for the new life. In ſuch caſes there is a total ſuſpenſion of the actions of life; the child remains to all appearance dead; and would die, if air was not thrown into its lungs, and the firſt principle of action by that means reſtored. To put this in a clearer light, Mr Hunter gives the reſult of ſome experiments made on a dog in 1755.—A pair of double bellows were provided, which were ſo conſtructed, that, by one action, air was thrown into the lungs, and by the other the air was ſucked out which had been thrown in by the former, without mixing them together. The muzzle of theſe bellows was fixed into the trachea of a dog, and by working them he was kept perfectly alive. While this artificial breathing was going on, the ſternum was taken off, ſo that the heart and lungs were expoſed to view. The heart then continued to act as before, only the frequency of its action was greatly increaſed. Mr Hunter then ſtopped the motion of the bellows; and obſerved that the contraction of the heart became gradually weaker and leſs frequent, till it left off moving altogether; but, by renewing the operation, the motion of the heart alſo revived, and ſoon became as ſtrong and frequent as before. This proceſs was repeated upon the ſame dog ten times; ſometimes ſtopping for five, eight, or ten minutes. Mr Hunter obſerved, that, every time he left off working the bellows, the heart became extremely turgid with blood, and the blood in the left ſide became as dark as that in the right, which was not the caſe when the bellows were working. Theſe ſituations of the animal, he obſerves, ſeem to be exactly ſimilar to drowning.

From theſe different views of this matter, phyſicians have differed conſiderably in their account of the methods to be followed in attempting the recovery of drowned perſons. De Haen recommends agitation of all kinds; every kind of ſtimulus applied to the mouth, noſe, and rectum; bleeding; heat, both by warm cloths and warm water; blowing air into the trachea; ſtimulants, ſuch as bliſters, warm aſhes, &c. applied to the head, ankles, thighs, pit of the ſtomach, and other parts.

Doctor Cullen's obſervations on this ſubject are as follow.—"With reſpect to the particular means to be employed for the recovery of drowned perſons, it is to be obſerved, in the firſt place, That ſuch as were recommended and practiſed, upon a ſuppoſition that the ſuffocation was occaſioned by the quantity of water taken into the body, and therefore to be evacuated again, were very unhappily adviſed. The hanging up of perſons by the heels, or ſetting them upon the crown of the head, or rolling the body upon a caſk, were generally practiſed, upon a ſuppoſition altogether falſe; or upon the ſuppoſition of a caſe which, if real, is apprehended to be irrecoverable. At the ſame time, theſe practices were always attended with the danger of burſting ſome veſſels in the brain or lungs, and of rendering thereby ſome caſes incurable, that were not ſo from the drowning alone. All ſuch practices, therefore, are now very properly diſapproved of and forbid.

"In thoſe caſes in which the body has not been long in the water, and in which therefore the natural heat is not entirely extinguiſhed, nor the irritability of the moving fibres very greatly impaired, it is poſſible that a good deal of agitation of the body may be the only means neceſſary to reſtore the action of the vital organs;

gans; but in other caſes, where the heat and irritability have ceaſed to a greater degree, it is to me very doubtful, if much agitation can be ſafe, and if any degree of it can be uſeful, till the heat and irritability are in ſome meaſure reſtored. In all caſes, any violent concuſſion cannot be ſafe, and, I believe, is never neceſſary. It may be proper here to obſerve alſo, that, in tranſporting the body from the place where it is taken out of the water, to the place where it may be neceſſary for applying the proper means of its recovery, all poſtures expoſing to any improper compreſſion, as that of the body's being carried over a man's ſhoulder, are to be avoided. The body is to be kept ſtretched out, with the head and upper parts a little raiſed; and care is to be taken to avoid the neck's being bent much forward. In this manner, laid upon one ſide, and upon ſome ſtraw in a cart, it may be moſt properly conveyed; and the agitation which a pretty briſk motion of the cart may occaſion, will, in moſt caſes, do no harm.

“ From the account I have given above of the cauſes, or of the appearances, of death, in drowned perſons, it is evident, that the firſt ſtep to be taken for their recovery is to reſtore the heat of the body, which is abſolutely neceſſary to the activity of the moving fibres. For this purpoſe, the body, as ſoon as poſſible, is to be ſtripped of its wet clothes, to be well dried, and to be wrapped up in dry, and (if poſſible) warm, coverings: and it is to be wiſhed, in all caſes, as ſoon as the report of a perſon's being drowned is heard, that blankets ſhould be immediately carried to the water-ſide; ſo that, as ſoon as the body is got out of the water, the change of covering juſt now mentioned may be inſtantly made; or, if the body has been naked when drowned, that it may be immediately dried, and defended againſt the cold of the air. Beſides covering the body with blankets, it will be further of advantage, if it can be done without loſe of time, to cover the drowned body with a warm ſhirt or waiſtcoat immediately taken from a living perſon.

“ When, at the time of a perſon's being drowned, it happens that the ſun ſhines out very hot, I think there can be no better means of recovering the heat, than by expoſing the naked body, in every part, to the heat of the ſun; while, at the ſame time, all other means neceſſary or uſeful for the recovery of life are alſo employed.

“ When the heat of the ſun cannot be employed, the body ſhould be immediately tranſported to the neareſt houſe that can be got convenient for the purpoſe: The fitteſt will be one that has a tolerably large chamber, in which a fire is ready, or can be made; and, if poſſible, the houſe ſhould afford another chamber, in which alſo a fire can be provided.

“ When the drowned body is brought into ſuch houſe, and care is at the ſame time taken that no more people are admitted than are abſolutely neceſſary to the ſervice of the drowned perſon, every endeavour muſt be immediately employed for recovering the heat of the body, and that by different meaſures, as circumſtances ſhall direct.

“ If, in the neighbourhood of the place, there be any brewery, diſtillery, dyery, or fabric which gives an opportunity of immediately obtaining a quantity of warm water and a convenient veſſel, there is nothing more proper than immerſing the body in a warm bath. Even where a ſufficient quantity of warm water cannot be had at once, the bath may be ſtill practiſed, if the accident has happened in or very near a town or village, when a great many fires may be at once employed in heating ſmall quantities of water; for in this way the neceſſary quantity may be ſoon obtained. To encourage this practice, it is to be obſerved, That one part of boiling water is more than ſufficient to give the neceſſary heat to two parts of ſpring or ſea water, as it is not proper to apply the bath at firſt very warm, nor even of the ordinary heat of the human body, but ſomewhat under it; and, by the addition of warm water, to bring it gradually to a heat very little above it.

“ If the drowned body be of no great bulk, it may be conveniently warmed by a perſon's lying down in bed with it, and taking it near to their naked body, changing the poſition of it frequently, and at the ſame time chaffing and rubbing with warm cloths the parts which are not immediately applied to their warm body.

“ If none of theſe meaſures can be conveniently practiſed, the body is to be laid upon a bed before a moderate fire, and frequently turned, to expoſe the different parts of it; and thus, by the heat of the fire gradually applied, and by rubbing the body well with coarſe towels, or other cloths well warmed, pains are to be taken for reſtoring its heat. This will be promoted by warm cloths applied and frequently renewed under the hams and arm-pits; and by hot bricks, or bottles of warm water, laid to the feet.

“ In the practice of rubbing, it has been propoſed to moiſten the cloths applied with camphorated ſpirits, or other ſuch ſtimulating ſubſtances: but I think this muſt prove an impediment to the rubbing; and I would not recommend any practice of this kind, except, perhaps, the application of the vinous ſpirit of ſal ammoniac to the wriſts and ankles only.

“ For recovering the heat of the body, it has been propoſed, to cover it all over with warm grains, aſhes, ſand, or ſalt; and where theſe, ſufficiently warm, are ready at hand, they may be employed; but it is very ſeldom they can be obtained, and the application might often interfere with other meaſures that may be neceſſary. All therefore that I can propoſe, with reſpect to the uſe of theſe, is to obſerve, that bags of warm and dry ſalt may be amongſt the moſt convenient applications to the feet and hands of drowned perſons; and the quantity neceſſary for this purpoſe may be got pretty quickly by heating the ſalt in a frying-pan over a common fire.

“ While theſe meaſures are taking for recovering the heat, means are at the ſame time to be employed for reſtoring the action of the moving fibres. It is well known, that the inteſtines are the parts of the body which, both from their internal ſituation and peculiar conſtitution, retain the longeſt their irritability; and therefore, that, in drowned perſons, ſtimulants applied may have more effect upon the inteſtines than upon other parts. The action, therefore, of the inteſtines is to be ſupported or renewed as ſoon as poſſible; as the reſtoring and ſupporting the action of ſuch a conſiderable portion of moving fibres as thoſe of the inteſtines, muſt contribute greatly to reſtore the activity of the whole ſyſtem.

“ For exciting the action of the inteſtines, the moſt proper mean is, the application of their ordinary ſtimulus of dilatation; and this is moſt effectually applied, by forcing a quantity of air into them by the fundament. Even the throwing in cold air has been found uſeful: but it will certainly be better if heated air can be employed; and further, if that air can be impregnated with ſomething which, by its acrimony, alſo may be powerful in ſtimulating the inteſtines.

“ From all theſe conſiderations, the ſmoke of burning tobacco has been moſt commonly applied, and has upon many occaſions proved very effectual. This will be moſt properly thrown in by a particular apparatus, which, for other purpoſes as well as this, ſhould be in the hands of every ſurgeon; or at leaſt ſhould, at the public expence, be at hand in every part of the country where drownings are likely to happen. With regard to the uſe of it, I have to obſerve, that till the tobacco is kindled in a conſiderable quantity, a great deal of cold air is blown through the box and tube; and as that, as hinted above, is not ſo proper, care ſhould be taken to have the tobacco very well kindled, and to blow through it very gently, till the heated ſmoke only paſſes through. If, upon certain occaſions, the apparatus referred to ſhould not be at hand, the meaſure however may be executed by a common tobacco pipe, in the following manner: A common glyſter-pipe that has a bag mounted upon it, is to be introduced into the fundament, and the mouth of the bag is to be applied round the ſmall end of a tobacco-pipe. In the bowl of this, tobacco is to be kindled; and, either by a playing card made into a tube and applied round the mouth of the bowl, or by applying upon this the bowl of another pipe that is empty and blowing through it, the ſmoke may be thus forced into the inteſtines, and, in a little time, in a conſiderable quantity.

“ If none of theſe means for throwing in the ſmoke can be employed, it may be uſeful to inject warm water to the quantity of three or four Engliſh pints. This may be done by a common glyſter-bag and pipe, but better by a large ſyringe; and it may be uſeful to diſſolve in the water ſome common ſalt, in the proportion of half an ounce to an Engliſh pint; and alſo, to add to it ſome wine or brandy.

“ While theſe meaſures for recovering the heat of the body and the activity of the moving fibres are employed, and eſpecially after they have been employed for ſome time, pains are to be taken to complete and finiſh the buſineſs, by reſtoring the action of the lungs and heart.

“ On this ſubject, I am obliged to my learned and ingenious colleague, Doctor Monro, who has made ſome experiments for aſcertaining the beſt manner of inflating the lungs of drowned perſons. By theſe experiments he finds it may be more conveniently done by blowing into one of the noſtrils, than by blowing into the mouth. For blowing into the noſtril, it is neceſſary to be provided with a wooden pipe, fitted at one extremity for filling the noſtril, and at the other for being blown into by a perſon's mouth, or for receiving the pipe of a pair of bellows, to be employed for the ſame purpoſe. Doctor Monro finds, That a perſon of ordinary ſtrength can blow into ſuch a pipe, with a ſufficient force to inflate the lungs to a conſiderable degree; and thinks the warm air from the lungs of a living perſon will be moſt conveniently employed at firſt; but when it is not ſoon effectual in reſtoring the reſpiration of the drowned perſon, and that a longer continuance of the inflation is neceſſary, it may be proper to employ a pair of bellows, large enough at once to contain the quantity of air neceſſary to inflate the lungs to a due degree.

“ Whether the blowing-in is done by a perſon's mouth, or by bellows, Doctor Monro obſerves, that the air is ready to paſs by the gullet into the ſtomach; but that this may be prevented, by preſſing the lower part of the larynx backwards upon the gullet. To perſons of a little knowledge in anatomy, it is to be obſerved, that the preſſure ſhould be only upon the cricoid cartilage, by which the gullet may be ſtraitened, while the paſſage through the larynx is not interrupted.

When, by blowing thus into the noſtril, it can be perceived, by the raiſing of the cheſt or belly, that the lungs are filled with air, the blowing in ſhould ceaſe; and, by preſſing the breaſt and belly, the air received into the lungs ſhould be again expelled; then the blowing and expulſion ſhould be again repeated; and thus the practice is to be continued, ſo as to imitate, as exactly as poſſible, the alternate motions of natural reſpiration.

“ It is hardly neceſſary to obſerve, that when the blowing into the noſtril is practiſed, the other noſtril and the mouth ſhould be accurately cloſed.

“ If it ſhould happen, that, in this practice, the air does not ſeem to paſs readily into the lungs, Doctor Monro informs me, it is very practicable to introduce directly into the glottis and trachea a crooked tube, ſuch as the catheter uſed for a male adult. For this he offers the following directions: The ſurgeon ſhould place himſelf on the right ſide of the patient; and, introducing the forefinger of his left hand at the right corner of the patient's mouth, he ſhould puſh the point of it behind the epiglottis; and uſing this as a directory, he may enter the catheter, which he holds in his right hand, at the left corner of the patient's mouth, till the end of it is paſſed beyond the point of his forefinger; and it is then to be let fall, rather than puſhed into the glottis; and through this tube, by a proper ſyringe applied to it, air may be with certainty blown into the lungs. I obſerve, that ſome ſuch meaſure had been propoſed by Monſ. Le Cat in France; but I have not learned that it has ever been put in practice, and I am afraid it may be attended with ſeveral difficulties, and muſt be left to the diſcretion of ſurgeons, who may be properly provided and inſtructed for this purpoſe.

“ For throwing air with more certainty into the lungs, it has been propoſed to open the windpipe in the ſame manner as is done in the operation which the ſurgeons call *bronchotomy*, and by this opening to blow into the lungs; and when the blowing into the noſtril does not ſeem to ſucceed, and a ſkilful operator is at hand, I allow that the meaſure may be tried; but I can hardly ſuppoſe, that it will be of any advantage when the blowing in by the noſtril has entirely failed.

“ It is to be hoped, that by blowing into the lungs one way or other, even a quantity of water which had been taken into the lungs may be again waſhed out; and the ſame ſeems to be the only effectual means of waſhing out that frothy matter which is found to fill the lungs of drowned perſons, and which proves, if I miſtake not, the moſt common cauſe of their mortal ſuffocation. This practice, therefore, is to be immediately entered upon, and very aſſiduouſly continued for an hour or two together.

"I have now mentioned the meaſures chiefly to be purſued and depended upon for the recovery of drowned perſons; but muſt ſtill mention ſome others that may prove conſiderable helps to it.

"One of theſe is, the opening the jugular veins to relieve the congeſtion, which almoſt conſtantly occurs in the veins of the head, and is probably a frequent cauſe of the death of drowned perſons. For relieving this congeſtion, the drawing ſome blood from the jugulars, very early, may certainly be of ſervice; and it will be particularly indicated by the livid and purple colour of the face. It may even be repeated, according to the effect it ſeems to have in taking off that ſuffuſion; but when the drowned perſon is in ſome meaſure recovered, and ſome motion of the blood is reſtored, it will be proper to be very cautious in making this evacuation, and at leaſt to take care not to puſh it ſo far as to weaken too much the recovering, but ſtill weak, powers of life.

"Another meaſure for recovering the activity of the vital principle, is the application of certain ſtimulants to the more ſenſible parts of the body, ſuch as holding the quick-lime ſpirit of ſal ammoniac to the noſe, or putting a little of it upon a rag into the noſtrils. It has been uſual to pour ſome liquids into the mouth; but it is dangerous to pour in any quantity of liquid, till it appear that the power of ſwallowing is in ſome meaſure reſtored.

"When a ſurgeon is at hand, and is provided with proper apparatus, a crooked pipe may be introduced into the gullet; and by this a gill or two of warm wine may be poured down into the ſtomach, and probably with advantage. But when no ſuch apparatus is at hand, or ſurgeon to employ it, and the power of ſwallowing is ſtill doubtful, the trial of pouring liquids into the mouth ſhould be made by a ſmall quantity of warm water alone; and when, from ſuch trial, the power of ſwallowing ſhall appear to be recovered, it may then be allowable to favour the further recovery of the perſon, by pouring in ſome wine or brandy.—In ſhort, till ſome marks of the recovery of ſwallowing and reſpiration appear, it will not be ſafe to apply any ſtimulants to the mouth, excepting that of a few drops of ſome acrid ſubſtance to the tongue, and which are not of bulk enough to ſlide back upon the glottis: I can think of no ſtimulant, more conveniently and ſafely to be applied to the mouth and noſtrils, than a moderate quantity of tobacco-ſmoke blown into them.

"Though I do not imagine that drowned perſons are ever hurt by the quantity of water taken into their ſtomach, yet, as a ſtimulus applied to the ſtomach, and particularly as the action of vomiting proves a ſtimulus to the whole ſyſtem, I can have no objection to the French practice of throwing in an emetic as ſoon as any ſwallowing is reſtored. For this purpoſe, I would ſucceſſively throw in ſome tea-ſpoonfuls of the ipecacuanha wine; and, when it does not interfere with other neceſſary meaſures, the fauces may be gently irritated by an oiled feather thruſt into them.

"With regard to the ſtimulants, I muſt conclude with obſerving, That when a body has lain but for a ſhort time in the water, and that therefore its heat and irritability are but little impaired, the application of ſtimulants alone has been often found effectual for the recovery: but, on the contrary, when the body has lain long in the water, and the heat of it is very much extinguiſhed, the application of any other ſtimulants than that of tobacco-ſmoke to the inteſtines can be of very little ſervice; and the application of others ought never to interfere with the meaſures for recovering heat and the motion of reſpiration.

"With reſpect to the whole of theſe practices, I expect, from the principles upon which they are in general recommended, it will be underſtood, that they are not to be ſoon diſcontinued, though their effects do not immediately appear. It is obvious, that, in many caſes, it may be long before the heat of the body, and the activity of the vital principle, can be reſtored, although, in a longer time, it may very poſſibly be accompliſhed. In fact, it has often happened, that tho' means, employed for one hour, have not ſucceeded, the ſame continued for two or more hours, have, at length, had the wiſhed for effects. It ſhould therefore be a conſtant rule, in this buſineſs, that the proper means ſhould be employed for ſeveral hours together; unleſs it happen, that, while no ſymptoms of returning life appear, the ſymptoms of death ſhall, at the ſame time, go on conſtantly increaſing.

"In the whole of the above I have kept in view chiefly the caſe of drowned perſons: but it will be obvious, that many of the meaſures propoſed will be equally proper and applicable in other caſes of ſuffocation; as thoſe from ſtrangling, the damps of mines, the fumes of charcoal, &c.; and a little attention to the difference of circumſtances will lead to the meaſures moſt proper to be employed."

Mr Hunter, in the before-mentioned paper, differs pretty conſiderably from De Haen and Dr Cullen. He obſerves, that when aſſiſtance is ſoon called in after immerſion, blowing air into the lungs will in ſome caſes effect a recovery; but when any conſiderable time has been loſt, he adviſes ſtimulant medicines, ſuch as the vapour of volatile alkali, to be mixed with the air; which may eaſily be done, by holding ſpirits of hartſhorn in a cup under the receiver of the bellows. And, as applications of this kind to the olfactory nerves tend greatly to rouſe the living principle, and put the muſcles of reſpiration into action, it may probably, therefore, be moſt proper to have air impregnated in that manner thrown in by the noſe. To prevent the ſtomach and inteſtines from being too much diſtended by the air ſo injected, the larynx is directed to be gently preſſed againſt the œſophagus and ſpine.

While this buſineſs is going on, an aſſiſtant ſhould prepare bed-cloaths, carefully brought to a proper degree of heat. Heat our author conſiders as congenial with the living principle; increaſing the neceſſity of action, it increaſes action; cold, on the other hand, leſſens the neceſſity, and of courſe the action is diminiſhed; to a due degree of heat, therefore, the living principle, he thinks, owes its vigour. From experiments, he ſays, it appears to be a law in animal bodies, that the degree of heat ſhould bear a proportion to the quantity of life; as life is weakened, this proportion requires great accuracy, while greater powers of life allow it greater latitudes.

After theſe and ſeveral other obſervations on the ſame ſubject, our author proceeds to more particular directions for the management of drowned people.

If bed-cloaths are put over the perſon, ſo as ſcarce to touch him, ſteams of volatile alkali, or of warm balſams, may be thrown in, ſo as to come in contact with many parts of the body. And it might probably be advantageous, Mr Hunter obſerves, to have ſteams of the ſame kind conveyed into the ſtomach. This, we are told, may be done by a hollow bougie, and a ſyringe; but the operation ſhould be very ſpeedily performed, as the inſtrument, by continuing long in the mouth, might produce ſickneſs, which our author ſays he would always wiſh to avoid.

Some of the warm ſtimulating ſubſtances, ſuch as juice of horſe-radiſh, pepper-mint water, and ſpirits of hartſhorn, are directed to be thrown into the ſtomach in a fluid ſtate, as alſo to be injected by the anus. Motion poſſibly may be of ſervice; it may at leaſt be tried; but as it hath leſs effect than any other of the uſually preſcribed ſtimuli, it is directed to be the laſt part of the proceſs.

The ſame care in the operator, in regulating the proportion of every one of theſe means, is here directed, as was formerly given for the application of heat. For every one of them, our author obſerves, may poſſibly have the ſame property of deſtroying entirely the feeble action which they have excited, if adminiſtered in too great a quantity: inſtead, therefore, of increaſing and haſtening the operations on the firſt ſigns of returning life being obſerved, as is uſually done, he deſires they may be leſſened; and adviſes their increaſe to be afterwards proportioned, as nearly as poſſible, to the quantity of powers as they ariſe.

When the heart begins to move, the application of air to the lungs ſhould be leſſened, that, when the muſcles of reſpiration begin to act, a good deal may be left for them to do.

Mr Hunter abſolutely forbids blood-letting in all ſuch caſes; for, as it not only weakens the animal principle, but leſſens life itſelf, it muſt conſequently, he obſerves, leſſen both the powers and diſpoſitions to action. For the ſame reaſon, he is againſt introducing any thing into the ſtomach that might produce ſickneſs or vomiting; and, on the ſame principle, he ſays, we ſhould avoid throwing tobacco fumes, or any other ſuch articles, up by the anus, as might tend to an evacuation that way.

The following is a deſcription of inſtruments recommended for ſuch operations by our author.

Firſt, A pair of bellows, ſo contrived, with two ſeparate cavities, that, by opening them when applied to the noſtrils or mouth of a patient, one cavity will be filled with common air, and the other with air ſucked out from the lungs, and by ſhutting them again, the common air will be thrown into the lungs, and that ſucked out of the lungs diſcharged into the room. The pipe of theſe ſhould be flexible; in length a foot, or a foot and an half; and, at leaſt, three eighths of an inch in width. By this the artificial breathing may be continued, while the other operations, the application of the ſtimuli to the ſtomach excepted, are going on, which could not be conveniently done if the muzzle of the bellows were introduced into the noſe. The end next the noſe ſhould be double, and applied to both noſtrils. *Secondly*, A ſyringe, with a hollow bougie, or flexible catheter, of ſufficient length to go into the ſtomach, and convey any ſtimulating matter into it, without affecting the lungs. *Thirdly*, a pair of ſmall bellows, ſuch as are commonly uſed in throwing fumes of tobacco up by the anus.

Notwithſtanding the differences in theory, however, between the phyſicians above-mentioned, it is certain, that within theſe few years great numbers of drowned people have been reſtored to life by a proper uſe of the remedies we have enumerated, and ſocieties for the recovery of drowned perſons have been inſtituted in different places. The firſt ſociety of this kind was inſtituted in Holland, where, from the great abundance of canals and inland ſeas, the inhabitants are particularly expoſed to accidents by water. In a very few years 150 perſons were ſaved from death by this ſociety; and many of theſe had continued upwards of an hour without any ſigns of life, after they had been taken out of the water. The ſociety was inſtituted at Amſterdam in 1767: and, by an advertiſement, informed the inhabitants of the United Provinces of the methods proper to be uſed on ſuch occaſions; offering rewards at the ſame time to thoſe who ſhould, with or without ſucceſs, uſe thoſe methods for recovering perſons drowned and ſeemingly dead. The laudable and humane example of the Dutch was followed in the year 1768 by the magiſtrates of health in Milan and Venice; afterwards by the magiſtrates of Hamburgh in the year 1771, by thoſe of Paris in the year 1772, and by the magiſtrates of London in 1774.

DRUG, a general term for goods of the druggiſt and grocery kinds, eſpecially thoſe uſed in medicine and dyeing. See MATERIA MEDICA, PHARMACY, and DYEING.

DRUGGET, in commerce, a ſtuff ſometimes all wool, and ſometimes half wool half thread, ſometimes corded, but uſually plain. Thoſe that have the woof of wool, and the warp of thread, are called *threaded druggets*; and thoſe wrought with the ſhuttle on a loom of four marches, as the ſerges of Moui, Beauvois, and other like ſtuffs corded, are called *corded druggets*. As to the plain, they are wrought on a loom of two marches, with the ſhuttle, in the ſame manner as cloth, camblets, and other like ſtuffs not corded.

DRUIDS, the prieſts among the ancient Britons and Gauls.—The word is formed from the Celtic, *deru*, an oak; becauſe they held that tree in the higheſt veneration.

Their antiquity is eſteemed equal to that of the Brachmans of India, the Magi of Perſia, and the Chaldees of Babylon. And whoever conſiders the ſurpriſing conformity of their doctrine, will find ſufficient reaſon to think that they all derived it from the ſame hand, we mean from Noah and his immediate deſcendants, who carried it with them at their diſperſion; for it cannot be ſuppoſed that the Britiſh druids derived their doctrine from any foreign ſect, to whom they were abſolutely unknown.

But the druids were not contented with the power annexed to the prieſthood: they introduced religion into every tranſaction both public and private, ſo that nothing could be done without their approbation; and by this means their authority was rendered almoſt abſolute. They elected the annual magiſtrates of every diſtrict, who ſhould have enjoyed during that term the ſupreme authority, and ſometimes the title of *kings:* but they could not even call a council without their approbation and advice; ſo that, notwithſtanding their pretended authority, they were in reality the creatures and ſlaves of the druids.

They exerciſed the ſame arbitrary power in their courts of juſtice; and whoever refuſed to ſubmit to their deciſions, were excluded from the public ſacrifices, which was conſidered as the greateſt puniſhment that could be inflicted. It muſt, however, be acknowledged, that their adminiſtration of juſtice has always been celebrated for its impartiality. The ſole management and inſtruction of youth was alſo committed to them, except the training them up in the art of war; for both they and their diſciples were not only exempted from going to war, but likewiſe from all kind of tribute.

Their garments were remarkably long; and, when employed in religious ceremonies, they always wore a white ſurplice. They generally carried a wand in their hands; and wore a kind of ornament enchaſed in gold about their necks, called the *druid's egg*. Their necks were likewiſe decorated with gold chains, and their hands and arms with bracelets: they wore their hair very ſhort, and their beards remarkably long.

They were all ſubordinate to a chief or ſovereign pontiff, ſtyled the *arch-druid*, choſen from among their fraternity by a plurality of voices; but, in caſe of a competition too powerful to be decided by a majority, the conteſt was determined by the ſword. He enjoyed his ſupremacy for life, had power to inſpect the conduct of kings, and either to elect or depoſe whenever he pleaſed.

It was one of the maxims of their religion, not to commit any thing to writing; but deliver all their myſteries and learning in verſes compoſed for that purpoſe; and theſe were in time multiplied to ſuch a number, that it generally took up 20 years to learn them all by heart. By this means their doctrines appeared more myſterious by being unknown to all but themſelves; and having no books to recur to, they were the more careful to fix them in their memory.

But what had ſtill a more direct tendency to impoſe on the public, was their pretended familiar intercourſe with the gods. And in order at once to conceal their own ignorance, and render the impoſition leſs ſuſceptible of detection, they boaſted of their great ſkill in magic, and cultivated ſeveral branches of the mathematics, particularly aſtronomy. The latter they carried to ſome degree of perfection; for they were able to foretel the times, quantities, and durations, of eclipſes: a circumſtance which could not fail of attracting reverence from an ignorant multitude, who were perſuaded that nothing leſs than a ſupernatural power was ſufficient to make ſuch aſtoniſhing predictions. They alſo ſtudied natural philoſophy, and practiſed phyſic.

They worſhipped the Supreme Being under the name of *Eſus*, or *Heſus*, and the ſymbol of the oak; and had no other temple than a wood or a grove, where all their religious rites were performed. Nor was any perſon admitted to enter that ſacred receſs, unleſs he carried with him a chain, in token of his abſolute dependence on the Deity. Indeed, their whole religion originally conſiſted in acknowledging, that the Supreme Being, who made his abode in theſe ſacred groves, governed the univerſe; and that every creature ought to obey his laws, and pay him divine homage.

They conſidered the oak as the emblem, or rather the peculiar reſidence, of the Almighty; and accordingly chaplets of it were worn both by the druids and people in their religious ceremonies, the altars were ſtrewed with its leaves and encircled with its branches. The fruit of it, eſpecially the miſletoe, was thought to contain a divine virtue, and to be the peculiar gift of heaven. It was therefore ſought for on the ſixth day of the moon with the greateſt earneſtneſs and anxiety; and when found was hailed with ſuch raptures of joy, as almoſt exceeds imagination to conceive. As ſoon as the druids were informed of this fortunate diſcovery, they prepared every thing ready for the ſacrifice under the oak, to which they faſtened two white bulls by the horns: then the arch-druid, attended by a prodigious number of people, aſcended the tree, dreſſed in white; and with a conſecrated golden knife, or pruning hook, cropped the miſletoe, which he received in his ſagum or robe, amidſt the rapturous exclamations of the people. Having ſecured this ſacred plant, he deſcended the tree; the bulls were ſacrificed; and the Deity invoked to bleſs his own gift, and render it efficacious in thoſe diſtempers in which it ſhould be adminiſtered.

The conſecrated groves, in which they performed their religious rites, were fenced round with ſtones, to prevent any perſon's entering between the trees, except through the paſſages left open for that purpoſe, and which were guarded by ſome inferior druids, to prevent any ſtranger from intruding into their myſteries. Theſe groves were of different forms; ſome quite circular, others oblong, and more or leſs capacious as the numbers of votaries in the diſtricts to which they belonged were more or leſs numerous. The area in the centre of the grove was encompaſſed with ſeveral rows of large oaks ſet very cloſe together. Within this large circle were ſeveral ſmaller ones ſurrounded with large ſtones; and near the centre of theſe ſmaller circles, were ſtones of a prodigious ſize, and convenient height, on which the victims were ſlain and offered. Each of theſe being a kind of altar, was ſurrounded with another row of ſtones, the uſe of which cannot now be known, unleſs they were intended as cinctures to keep the people at a convenient diſtance from the officiating prieſt. Nor is it unreaſonable to ſuppoſe, that they had other groves appointed for ſecular purpoſes, and perhaps planted with oaks as the others were, that the ſacred trees might ſtrike the members of ſuch courts and councils with awe, and prevent all quarrels and indecent expreſſions.

While the religion of the druids continued pure and unmixed with any foreign cuſtoms, they offered only oblations of fine flour ſprinkled with ſalt, and adored the Supreme Being in prayers and thankſgivings. But after they had for ſome time carried on a commerce with the Phœnicians, they loſt their original ſimplicity, adored a variety of gods, adopted the barbarous cuſtom of offering human victims, and even improved on the cruelty of other nations; uſing theſe unfortunate mortals for the purpoſes of divination, with ſuch barbarous cruelty as is ſhocking to human nature to relate. Practices like theſe ſoon rendered them ſo deaf to the voice of humanity, that on extraordinary occaſions they erected a monſtrous hollow pile of oſier, which they filled with theſe unhappy wretches, and burnt them to their gods. Criminals were indeed choſen for this barbarous ſacrifice; but, in want of theſe, the innocent became victims of a cruel ſuperſtition.

We have already mentioned, that in their ſacred groves were ſeveral large ſtones, ſuppoſed to be the altars on which they offered their victims. Some of theſe ſtones are ſtill remaining in England, Wales, Ireland, and the iſland of Angleſey; and are of ſuch an amazing magnitude, that the bringing and rearing them was thought by the ſuperſtitious to have been the work of thoſe dæmons ſuppoſed to attend on that manner of worſhip.

Temples they had none before the coming of the Romans, nor in all probability for a long time after: for with regard to thoſe vaſt piles of ſtones ſtill remaining, they ſeem rather to have been funeral monuments than places of worſhip; eſpecially as all the ancient writers agree that their religious ceremonies were always performed in their conſecrated groves. Accordingly Tacitus, ſpeaking of the deſcent of the Romans, tells us, that their firſt care was to deſtroy thoſe groves and woods which had been polluted with the blood of ſo many human victims.

One of the chief tenets taught by the druids was the immortality of the ſoul, and its tranſmigration from one body to another; a doctrine which they conſidered as proper to inſpire them with courage, and a contempt of death. They alſo inſtructed their diſciples in ſeveral traditions concerning the ſtars and their motions, the extent of the world, the nature of things, and the power of the immortal gods. But as they never committed any of their tenets to writing, in order at once to conceal their myſterious learning from the vulgar, and exerciſe the minds of their diſciples, the greateſt part of them are now irrecoverably buried in oblivion.

DRUM, is a martial muſical inſtrument in form of a cylinder, hollow within, and covered at the two ends with vellum, which is ſtretched or ſlackened at pleaſure by the means of ſmall cords or ſliding knots: it is beat upon with ſticks. Drums are ſometimes made of braſs, but moſt commonly they are of wood.—The drum is by Le Clerc ſaid to have been an Oriental invention, and to have been brought by the Arabians, or perhaps rather the Moors, into Spain.

Kettle DRUMS, are two ſorts of large baſons of copper or braſs, rounded in the bottom, and covered with vellum, or goat-ſkin, which is kept faſt by a circle of iron round the body of the drum, with a number of ſcrews to ſcrew up and down. They are much uſed among the horſe; as alſo in operas, oratorios, concerts, &c.

DRUM, or *Drummer*, he that beats the drum; of whom each company of foot has one, and ſometimes two. Every regiment has a drum-major, who has the command over the other drums. They are diſtinguiſhed from the ſoldiers, by cloaths of a different faſhion: their poſt, when a battalion is drawn up, is on the flanks, and on a march it is betwixt the diviſions.

DRUM *of the Ear*, the ſame with the *Tympanum*. See ANATOMY, n° 405.

DRUMMOND (William), a polite writer, born in Scotland, in 1585, was the ſon of Sir John Drummond, gentleman-uſher to king James VI. He had his education at Edinburgh; and afterwards being ſent into France, ſtudied the civil law at Bourges: but his genius leading him to polite literature, he returned to Scotland, and retired to his agreeable ſeat at Hawthornden. Here he ſpent his time in reading Greek and Latin authors, and obliged the world with ſeveral fine productions. He wrote his *Cypreſs Grove*, a piece of excellent proſe, after a dangerous fit of ſickneſs; and about this time his *Flowers of Sion*, in verſe. But an accident befel him, which obliged him to quit his retirement; and that was the death of an amiable lady he was juſt going to be married to. This affected him ſo deeply, that he went to Paris and Rome, between which two places he reſided eight years. He travelled alſo through Germany, France, and Italy: where he viſited univerſities; converſed with learned men; and made a choice collection of the beſt ancient Greek, and of the modern Spaniſh, French, and Italian books. He then returned to his native country, where a civil war was juſt ready to break out: upon which he retired again, and in this retirement is ſuppoſed to have written his *Hiſtory of the five James's*, ſucceſſively kings of Scotland, which was not publiſhed till after his death. Beſides this, he compoſed ſeveral other tracts againſt the meaſures of the covenanters and thoſe engaged in the oppoſition of Charles I. In a piece called *Irene*, he harangues the king, nobility, and clergy, about their mutual miſtakes, fears, and jealouſies: he lays before them the conſequences of a civil war, from indiſputable arguments and the hiſtories of paſt times. The great marquis of Montroſe wrote a letter to him, deſiring him to print this *Irene*, as the beſt means to quiet the minds of a diſtracted people: he likewiſe ſent him a protection dated Auguſt 1645, immediately after the battle of Kilſyth, with a letter, in which he commends Mr Drummond's learning and loyalty. Mr Drummond wrote other things alſo with the ſame view of promoting peace and union, of calming the diſturbed minds of the people, of reaſoning the better ſort into moderation, and checking the growing evils which would be the conſequence of their obſtinacy. He died in the year 1649, having married a wife five years before, by whom he had ſome children: William, who was knighted in Charles the IId's time; Robert; and Elizabeth, who was married to Dr Henderſon a phyſician at Edinburgh. He had a great intimacy and correſpondence with the two famous Engliſh poets, Michael Drayton and Ben Johnſon; the latter of whom travelled from London on foot, to ſee him at his ſeat at Hawthornden. His works conſiſted of ſeveral things in verſe and proſe; an edition of which, with his life prefixed, was printed in folio at Edinburgh, 1711.

DRUNKENNESS, a well known diſorder in the brain, occaſioned by drinking too freely of ſpirituous liquors. Drunkenneſs appears in different ſhapes, in different conſtitutions: ſome it makes gay, ſome ſullen, and ſome furious.

The ancient Lacedemonians uſed to make their ſlaves frequently drunk, to give their children an averſion and horror for the ſame. The Indians hold drunkenneſs a ſpecies of madneſs; and in their language, the ſame term *(ramgam)*, that ſignifies *drunkard*, ſignifies alſo a *phrenetick*.

Drunkenneſs, by the law of England, is looked upon as an aggravation rather than an excuſe for any criminal behaviour. A drunkard, ſays Sir Edward Coke, who is *voluntarius dæmon*, hath no privilege thereby; but what hurt or ill ſoever he doth, his drunkenneſs doth aggravate it: *nam omne crimen ebrietas, et incendit, et detegit.* It hath been obſerved that the real uſe of ſtrong liquors, and the abuſe of them by drinking to exceſs, depend much upon the temperature of the climate in which we live. The ſame indulgence which may be neceſſary to make the blood move in Norway, would make an Italian mad. A German therefore, ſays the preſident Monteſquieu, drinks thro' cuſtom founded upon conſtitutional neceſſity; a Spaniard drinks through choice, or out of the mere wantonneſs of luxury; and drunkenneſs, he adds, ought to be more ſeverely puniſhed where it makes men miſchievous and mad, as in Spain and Italy, than where it only renders them ſtupid and heavy, as in Germany and more northern countries. And accordingly, in the warmer climate of Greece, a law of Pittacus enacted, "that he who committed a crime when drunk, ſhould receive a double puniſhment;" one for the crime itſelf, and the other for the ebriety which prompted him to commit it. The Roman law indeed made great allowances for this vice: *per vinum delapſis capitalis pœna remittitur.* But the law of England, conſidering how eaſy it is to counterfeit this excuſe, and how weak an excuſe it is (though real), will not ſuffer any man thus to privilege one crime by another.

For the offence of drunkenneſs a man may be puniſhed in the eccleſiaſtical court, as well as by juſtices of peace by ſtatute. And by 4 *Jac.* I. *c.* 5. and 21 *Jac.* I. *c.* 7. if any perſon ſhall be convicted of drunkenneſs by the view of a juſtice, oath of one witneſs, &c. he ſhall forfeit 5s. for the firſt offence, to be levied by diſtreſs and ſale of his goods; and for want of a diſtreſs, ſhall ſit in the ſtocks ſix hours: and, for the ſecond offence, he is to be bound with two ſureties in 10l. each, to be of good behaviour, or to be committed. And he who is guilty of any crime thro' his own voluntary drunkenneſs, ſhall be puniſhed for it as if he had been ſober. It has been held that drunkenneſs is a ſufficient cauſe to remove a magiſtrate: and the proſecution for this offence by the ſtatute of 4 *Jac.* I. *c.* 5. was to be, and ſtill may be, before juſtices of peace in their ſeſſions by way of indictment, &c. Equity will not relieve againſt a bond, &c. given by a man when drunk, unleſs the drunkenneſs is occaſioned through the management or contrivance of him to whom the bond is given.

DRUPA, or **DRUPPA**, in botany, a ſpecies of *pericarpium*, or ſeed-veſſel, which is ſucculent or pulpy, has no valve or external opening like the capſule and pod, and contains within its ſubſtance a ſtone or nut. The cherry, plumb, peach, apricot, and all other ſtone-fruit, are of this kind.

The term, which is of great antiquity, is ſynonimous to Tournefort's *fructus mollis oſſiculo*, "ſoft fruit with a ſtone;" and to the *prunus* of other botaniſts.

The ſtone, or nut, which, in this ſpecies of fruit, is ſurrounded by the ſoft pulpy fleſh, is a kind of ligneous or woody cup, which contains a ſingle kernel or ſeed.

This definition, however, will not apply to every ſeed-veſſel denominated *drupa* in the *Genera Plantarum.* The almond is a *drupa,* ſo is the ſeed-veſſel of the elm-tree and the genus *rumphia;* though far from being pulpy or ſucculent, the firſt and third are of a ſubſtance like leather, the ſecond like parchment. The ſame may be ſaid of the walnut, piſtachia-nut, *guettarda, quiſqualis,* jack-in-a-box, and ſome others.

Again, the ſeeds of the elm, *ſchrebera, flagellaria,* and the mango-tree, are not contained in a ſtone. The ſeed-veſſel of burr-reed is dry, ſhaped like a top, and contains two angular ſtones.

This ſpecies of fruit, or more properly ſeed-veſſel, is commonly roundiſh, and, when ſeated below the calix or receptacle of the flower, is furniſhed, like the apple, at the end oppoſite to the foot-ſtalk, with a ſmall umbilicus or cavity, which is produced by the ſwelling of the fruit before the falling off of the flower-cup.

DRUSIUS (John), a Proteſtant writer of great learning, born at Oudenarde in Flanders in 1555. He was deſigned for the ſtudy of divinity; but his father being outlawed, and deprived of his eſtate, they both retired to England, where the ſon became profeſſor of the Oriental languages at Oxford: but, upon the pacification of Ghent, they returned to their own country, where Druſius was alſo appointed profeſſor of the Oriental languages. From thence he removed to Frieſland, where he was admitted Hebrew profeſſor in the univerſity of Franeker; the functions of which he diſcharged with great honour till his death in 1616. His works ſhew him to have been well ſkilled in Hebrew; and the States General employed him in 1600, to write notes on the moſt difficult paſſages in the Old Teſtament, with a penſion of 400 florins a-year: but being frequently diſturbed in this undertaking, it was not publiſhed till after his death. He held a vaſt correſpondence with the learned; for beſides letters in Hebrew, Greek, and other languages, there were found 2300 Latin letters among his papers. He had a ſon John, who died in England at 21, and was a prodigy for his early acquiſition of learning; he wrote Notes on the Proverbs of Solomon, with many letters and verſes in Hebrew.

DRYADS, in the heathen theology, a ſort of deities, or nymphs, which the ancients thought inhabited groves and woods. They differed from the Hamadryades, theſe latter being attached to ſome particular tree, with which they were born, and with which they died; whereas the Dryades were goddeſſes of trees and woods in general.

DRYDEN (John), one of the moſt eminent Engliſh poets of the 17th century, deſcended of a genteel family in Huntingdonſhire, was born in that county at Oldwincle 1631, and educated at Weſtminſter ſchool under Dr Buſby. From thence he was removed to Cambridge in 1650, being elected ſcholar of Trinity college, of which he appears by his *epithalamia Cantabrigienſ.* 4to, 1662, to have been afterwards a fellow. Yet, in his earlier days, he gave no extraordinary indications of genius; for, even the year before he quitted the univerſity, he wrote a poem on the death of Lord Haſtings, which was by no means a preſage of that amazing perfection in poetical powers which he afterwards poſſeſſed.

On the death of Oliver Cromwell he wrote ſome heroic ſtanzas to his memory; but, on the Reſtoration, being deſirous of ingratiating himſelf with the new court, he wrote, firſt a poem intitled *Aſtræa Redux*, and afterwards a panegyric to the king on his coronation. In 1662, he addreſſed a poem to the Lord Chancellor Hyde, preſented on New Year's day; and in the ſame year a ſatire on the Dutch. In 1668, appeared his *Annus Mirabilis*, which was an hiſtorical poem in celebration of the duke of York's victory over the Dutch. Theſe pieces at length obtained him the favour of the crown; and Sir William Davenant dying the ſame year, Mr Dryden was appointed to ſucceed him as poet laureat. About this time alſo his inclination to write for the ſtage ſeems firſt to have ſhewn itſelf. For beſides his concern with Sir William Davenant in the alteration of Shakeſpeare's Tempeſt, in 1669 he produced his *Wild Gallants* a comedy. This met with very indifferent ſucceſs; yet the author, not being diſcouraged by its failure, ſoon publiſhed his *Indian Emperor*. This, finding a more favourable reception, encouraged him to proceed; and that with ſuch rapidity, that, in the key to the duke of Buckingham's *Rehearſal*, he is recorded to have engaged himſelf by contract for the writing of four plays per year; and indeed, in the years 1679 and 1680, he appears to have fulfilled that contract. To this unhappy neceſſity that our author lay under, are to be attributed all thoſe irregularities, thoſe bombaſtic flights, and ſometimes even puerile exuberances, for which he has been ſo ſeverely criticiſed; and which, in the unavoidable hurry in which he wrote, it was impoſſible he ſhould find time either for lopping away or correcting.

In 1675, the earl of Rocheſter, whoſe envious and malevolent diſpoſition would not permit him to ſee growing merit meet with its due reward, and was therefore ſincerely chagrined at the very juſt applauſe with which Mr Dryden's dramatic pieces had been received, was determined, if poſſible, to ſhake his intereſt at court; and ſucceeded ſo far as to recommend Mr Crowne, an author by no means of equal merit, and at that time of an obſcure reputation, to write a maſque for the court, which certainly belonged to Mr Dryden's office as poet laureat.—Nor was this the only attack, nor indeed the moſt potent one, that Mr Dryden's juſtly acquired fame drew on him. For, ſome years before, the duke of Buckingham, a man of not much better character than Lord Rocheſter, had moſt ſeverely ridiculed ſeveral of our author's plays in his admired piece called the *Rehearſal*. But, though the intrinſic wit which runs through that performance cannot even to this hour fail of exciting our laughter, yet at the ſame time it ought not to be the ſtandard on which we ſhould fix Mr Dryden's poetical reputation, if we conſider, That the pieces there ridiculed are not any of thoſe looked on as the *chef d'oeuvres* of this author, that the very paſſages burleſqued, are frequently, in their original places, much leſs ridiculous, than when thus detached, like a rotten limb, from the body of the work; and expoſed to view with additional diſtortions, and diveſted of that connection with the other parts, which, while it preſerved, gave it not only ſymmetry but beauty; and laſtly, that the various inimitable beauties, which the critic has ſunk in oblivion, are infinitely more numerous than the deformities which he has thus induſtriouſly brought forth to our more immediate inſpection.

Mr Dryden, however, did not ſuffer theſe attacks to paſs with impunity: for, in 1679, there came out an *Eſſay on Satire*, ſaid to be written jointly by that gentleman and the earl of Mulgrave, containing ſome very ſevere reflections on the earl of Rocheſter and the ducheſs of Portſmouth, who, it is not improbable, might be a joint inſtrument in the above-mentioned affront ſhewn to Mr Dryden; and in 1681 he publiſhed his *Abſalom* and *Achitophel*, in which the well-known character of *Zimri*, drawn for the duke of Buckingham, is certainly ſevere enough to repay all the ridicule thrown on him by that nobleman in the character of *Bayes*.—The reſentment ſhewn by the different peers was very different. Lord Rocheſter, who was a coward as well as a man of the moſt depraved morals, baſely hired three ruffians to cudgel Dryden in a coffeehouſe: but the duke of Buckingham, as we are told, in a more open manner, took that taſk upon himſelf; and at the ſame time preſented him with a purſe containing no very trifling ſum of money; telling him, That he gave him the beating as a puniſhment for his impudence, but beſtowed the gold on him as a reward for his wit.

In 1680 was publiſhed a tranſlation of *Ovid's Epiſtles* in Engliſh verſe, by ſeveral hands, two of which, together with the preface, were by Mr Dryden; and in 1682, came out his *Religio Laici*, deſigned as a defence of revealed religion, againſt Deiſts, Papiſts, &c. Soon after the acceſſion of king James II. our author changed his religion for that of the church of Rome, and wrote two pieces in vindication of the Romiſh tenets, viz. *A Defence of the papers* written by the late king, found in his ſtrong box; and the celebrated poem, afterwards anſwered by Lord Halifax, entitled the *Hind and the Panther*.—By this extraordinary ſtep he not only engaged himſelf in controverſy, and incurred much cenſure and ridicule from his cotemporary wits; but, on the completion of the Revolution, being, on account of his newly-choſen religion, diſqualified from bearing any office under the government, he was ſtripped of the laurel, which, to his ſtill greater mortification, was beſtowed on Richard Flecknoe, a man to whom he had a moſt ſettled averſion. This circumſtance occaſioned his writing the very ſevere poem, called *Mac Flecknoe*.

Mr Dryden's circumſtances had never been affluent; but now being deprived of this little ſupport, he found himſelf reduced to the neceſſity of writing for mere bread. We conſequently find him from this period engaged in works of labour as well as genius, *viz.* in tranſlating the works of others; and to this neceſſity perhaps our nation ſtands indebted for ſome of the beſt tranſlations extant. In the year he loſt the laurel, he publiſhed the life of St *Francis Xavier* from the French. In 1693, came out a tranſlation of *Juvenal* and *Perſius*; in the firſt of which he had a conſiderable hand, and of the latter the entire execution. In 1695 was publiſhed his proſe verſion of *Freſnoy's art of painting*; and the year 1697 gave the world that tranſlation of *Virgil's* works entire, which ſtill does, and perhaps ever will, ſtand foremoſt among the attempts made on that author. The *petite pieces* of this eminent writer, ſuch as prologues, epilogues, epitaphs, elegies, ſongs, &c. are too numerous to ſpecify here, and too much diſperſed to direct the reader to. The greateſt part of them, however, are to be found in a collection of miſcellanies, in 6 vols 12mo. His laſt work is what is called his

Fables, which conſiſts of many of the moſt intereſting ſtories in Homer, Ovid, Boccace, and Chaucer, tranſlated or modernized in the moſt elegant and poetical manner; together with ſome original pieces, among which is that amazing ode on St *Cæcilia's* day, which, though written in the very decline of the author's life, and at a period when old age and diſtreſs conſpired as it were to damp his poetic ardor and clip the wings of fancy, yet poſſeſſes ſo much of both, as would be ſufficient to have rendered him immortal, had he never written a ſingle line beſides.

Dryden married the lady Elizabeth Howard, ſiſter to the earl of Berkſhire, who ſurvived him eight years; though for the laſt four of them ſhe was a lunatic, having been deprived of her ſenſes by a nervous fever.—By this lady he had three ſons; *Charles*, *John*, and *Henry*. Of the eldeſt of theſe, there is a circumſtance related by Charles Wilſon, Eſq; in his Life of Congreve, which ſeems ſo well atteſted, and is itſelf of ſo very extraordinary a nature, that we cannot avoid giving it a place here.—Dryden, with all his underſtanding, was weak enough to be fond of judicial aſtrology, and uſed to calculate the nativity of his children. When his lady was in labour with his ſon *Charles*, he being told it was decent to withdraw, laid his watch on the table, begging one of the ladies then preſent, in a moſt ſolemn manner, to take exact notice of the very minute that the child was born; which ſhe did, and acquainted him with it. About a week after, when his lady was pretty well recovered, Mr Dryden took occaſion to tell her that he had been calculating the child's nativity; and obſerved, with grief, that he was born in an evil hour: for Jupiter, Venus, and the Sun, were all under the earth, and the lord of his aſcendant afflicted with a hateful ſquare of Mars and Saturn. If he lives to arrive at the 8th year, ſays he, "he will go near to die a violent death on his very birth-day; but if he ſhould eſcape, as I ſee but ſmall hopes, he will in the 23d year be under the very ſame evil direction; and if he ſhould eſcape that alſo, the 33d or 34th year is, I fear"—here he was interrupted by the immoderate grief of his lady, who could no longer hear calamity propheſied to befal her ſon. The time at laſt came, and Auguſt was the inauſpicious month in which young Dryden was to enter into the 8th year of his age. The court being in progreſs, and Mr Dryden at leiſure, he was invited to the country-ſeat of the earl of Berkſhire, his brother-in-law, to keep the long vacation with him in Charlton in Wilts; his lady was invited to her uncle Mordaunt's, to paſs the remainder of the ſummer. When they came to divide the children, lady Elizabeth would have him take *John*, and ſuffer her to take *Charles*: but Mr Dryden was too abſolute, and they parted in anger; he took *Charles* with him, and ſhe was obliged to be content with *John*. When the fatal day came, the anxiety of the lady's ſpirits occaſioned ſuch an efferveſcence of blood, as threw her into ſo violent a fever, that her life was deſpaired of, till a letter came from Mr Dryden, reproving her for her womaniſh credulity, and aſſuring her that her child was well; which recovered her ſpirits, and in ſix weeks after ſhe received an ecclairciſſement of the whole affair. Mr Dryden, either through fear of being reckoned ſuperſtitious, or thinking it a ſcience beneath his ſtudy, was extremely cautious of letting any one know that he was a dealer in aſtrology; therefore could not excuſe his abſence, on his ſon's anniverſary, from a general hunting-match which Lord Berkſhire had made, to which all the adjacent gentlemen were invited. When he went out, he took care to ſet the boy a double exerciſe in the Latin tongue, which he taught his children himſelf, with a ſtrict charge not to ſtir out of the room till his return; well knowing the taſk he had ſet him would take up longer time. *Charles* was performing his duty, in obedience to his father: but, as ill fate would have it, the ſtag made towards the houſe; and the noiſe alarming the ſervants, they haſted out to ſee the ſport. One of them took young Dryden by the hand, and led him out to ſee it alſo; when, juſt as they came to the gate, the ſtag being at bay with the dogs, made a bold puſh, and leaped over the court-wall, which was very low and very old; and the dogs following, threw down a part of the wall 10 yards in length, under which *Charles Dryden* lay buried. He was immediately dug out; and after ſix weeks languiſhing in a dangerous way, he recovered. So far Dryden's prediction was fulfilled. In the 23d year of his age, *Charles* fell from the top of an old tower belonging to the Vatican at Rome, occaſioned by a ſwimming in his head, with which he was ſeized, the heat of the day being exceſſive. He again recovered, but was ever after in a languiſhing ſickly ſtate. In the 33d year of his age, being returned to England, he was unhappily drowned at Windſor. He had with another gentleman ſwam twice over the Thames; but returning a third time, it was ſuppoſed he was taken with the cramp, becauſe he called out for help, though too late. Thus the father's calculation proved but too prophetical.

At laſt, after a long life, harraſſed with the moſt laborious of all fatigues, *viz.* that of the mind, and continually made anxious by diſtreſs and difficulty, our author departed this life on the firſt of May 1701.—The day after Mr Dryden's death, the dean of Weſtminſter ſent word to Mr Dryden's widow, that he would make a preſent of the ground, and all other abbey-fees for the funeral: the Lord Halifax likewiſe ſent to the lady Elizabeth, and to Mr Charles Dryden, offering to defray the expences of our poet's funeral, and afterwards to beſtow 500l. on a monument in the abbey; which generous offer was accepted. Accordingly, on Sunday following, the company being aſſembled, the corpſe was put into a velvet hearſe, attended by 18 mourning coaches. When they were juſt ready to move, Lord Jefferys, ſon of Lord Chancellor Jefferys, a name dedicated to infamy, with ſome of his rakiſh companions riding by, aſked whoſe funeral it was; and being told it was Mr Dryden's, he proteſted he ſhould not be buried in that private manner; that he would himſelf, with the lady Elizabeth's leave, have the honour of the interment, and would beſtow 1000l. on a monument in the abbey for him. This put a ſtop to their proceſſion; and the Lord Jefferys, with ſeveral of the gentlemen, who had alighted from their coaches, went up ſtairs to the lady, who was ſick in bed. His Lordſhip repeated the purport of what he had ſaid below; but the lady Elizabeth refuſing her conſent, he fell on his knees, vowing never to riſe till his requeſt was granted. The lady under a ſudden ſurpriſe fainted away; and Lord Jefferys pretending to have obtained her conſent, ordered the body to be carried to Mr Ruſſel's an undertaker in Cheapſide, and to be left there till further orders. In the mean time the abbey was lighted up, the ground opened, the choir attending, and the biſhop waiting ſome hours to no purpoſe for the corpſe. The next day Mr *Charles Dryden* waited on my Lord Halifax and the biſhop; and endeavoured to excuſe his mother, by relating the truth. Three days after, the undertaker, having received no orders, waited on the Lord Jefferys; who pretended that it was a drunken frolic, that he remembered nothing of the matter, and he might do what he pleaſed with the body. Upon this, the undertaker waited upon the lady Elizabeth, who deſired a day's reſpite, which was granted. Mr *Charles Dryden* immediately wrote to the Lord Jefferys, who returned for anſwer, that he knew nothing of the matter, and would be troubled no more about it. Mr *Dryden* hereupon applied again to Lord Halifax, and the biſhop of Rocheſter; who abſolutely refuſed to do any thing in the affair.

In this diſtreſs, Dr Garth, who had been Mr Dryden's intimate friend, ſent for the corpſe to the college of phyſicians, and propoſed a ſubſcription; which ſucceeding, about three weeks after Mr Dryden's deceaſe, Dr Garth pronounced a fine Latin oration over the body, which was conveyed from the college, attended by a numerous train of coaches to Weſtminſter-abbey, but in very great diſorder. At laſt the corpſe arrived at the abbey, which was all unlighted. No organ played, no anthem ſung; only two of the ſinging boys preceding the corpſe, who ſung an ode of Horace, with each a ſmall candle in their hand. When the funeral was over, Mr *Charles Dryden* ſent a challenge to Lord Jefferys; who refuſing to anſwer it, he ſent ſeveral others, and went often himſelf; but could neither get a letter delivered, nor admittance to ſpeak to him: which ſo incenſed him, that finding his Lordſhip refuſed to anſwer him like a gentleman, he reſolved to watch an opportunity, and brave him to fight, though with all the rules of honour; which his Lordſhip hearing, quitted the town, and Mr *Charles* never had an opportunity to meet him, though he ſought it to his death, with the utmoſt application.

Mr Dryden had no monument erected to him for ſeveral years; to which Mr Pope alludes in his epitaph intended for Mr Rowe, in this line,

> Beneath a rude and nameleſs ſtone he lies.

In a note upon which, we are informed, that the tomb of Mr Dryden was erected upon this hint by Sheffield duke of Buckingham, to which was originally intended this epitaph:

> This *Sheffield* rais'd.—The ſacred duſt below
> Was *Dryden* once; the reſt who does not know.

Which was ſince changed into the plain inſcription now upon it, *viz.*

J. DRYDEN,
Natus Aug. 9, 1631.
Mortuus Maii 1, 1701.
Johannes Sheffield, dux Buckinghamienſis fecit.

Mr Dryden's character has been very differently drawn by different hands, ſome of which have exalted it to the higheſt degree of commendation, and others debaſed it by the ſevereſt cenſure.—The latter, however, we muſt charge to that ſtrong ſpirit of party which prevailed during great part of Dryden's time, and ought therefore to be taken with great allowances. Were we indeed to form a judgment of the author from ſome of his dramatic writings, we ſhould perhaps be apt to conclude him a man of the moſt licentious morals; many of his comedies containing a great ſhare of looſeneſs, even extending to obſcenity: But if we conſider, that, as the poet tells us,

> Thoſe who live to pleaſe, muſt pleaſe to live;

if we then look back to the ſcandalous licence of the age he lived in, the indigence which at times he underwent, and the neceſſity he conſequently lay under of complying with the public taſte however depraved; we ſhall ſurely not refuſe our pardon to the compelled writer, nor our credit to thoſe of his cotemporaries who were intimately acquainted with him, and who have aſſured us there was nothing remarkably vicious in his perſonal character.

From ſome parts of his hiſtory he appears unſteady, and to have too readily temporized with the ſeveral revolutions in church and ſtate. This however might in ſome meaſure have been owing to that natural timidity and diffidence in his diſpoſition, which almoſt all the writers ſeem to agree in his poſſeſſing. Congreve, whoſe authority cannot be ſuſpected, has given us ſuch an account of him, as makes him appear no leſs amiable in his private character as a man, than he was illuſtrious in his public one as a poet. In the former light, according to that gentleman, he was humane, compaſſionate, forgiving, and ſincerely friendly. Of an extenſive reading, a tenacious memory, and a ready communication: gentle in the correction of the writings of others, and patient under the reprehenſion of his own deficiencies: eaſy of acceſs himſelf, but ſlow and diffident in his advances to others; and of all men the moſt modeſt and the moſt eaſy to be diſcountenanced in his approaches either to his ſuperiors or his equals. As to his writings, he is perhaps the happieſt in the harmony of his numbers, of any poet who ever lived either before or ſince his time, not even Mr Pope himſelf excepted. His imagination is ever warm, his images noble, his deſcriptions beautiful, and his ſentiments juſt and becoming. In his proſe he is poetical without bombaſt, conciſe without pedantry, and clear without prolixity. His dramatic have, perhaps, the leaſt merit of all his writings. Yet there are many of them which are truly excellent; though he himſelf tells us that he never wrote any thing in that way to pleaſe himſelf but his *All for Love*. This laſt, indeed, and his *Spaniſh Friar*, may be reckoned two of the beſt plays our language has been honoured with.

DUBLIN, a city of Ireland, in the province of Leinſter, and capital of the whole kingdom, ſituated on the river Liffy, in W. Long. 6. 32. N. Lat. 53. 10. It is certainly a very ancient place, ſince we find it mentioned by Ptolemy under the name of *Eblana*, which he probably wrote *Deblana*. The Iriſh call it *Balacleigh*, that is, "The town founded upon hurdles or piles." It is ſaid to have been in the hands of the Engliſh as early as the days of king Edgar. We are aſſured, however, that it was, long after, in the hands of the Danes, or ſome other northern Nation, who introduced fortifications and trade into this country. They certainly made choice of and eſteemed it for its port, which was a very good one for any veſſels then in uſe; and for this reaſon, and becauſe it was but 60 miles from the coaſt of Wales, it came to be preferred by the Engliſh when this part of Ireland was reduced under their power. It has gradually, therefore, under the auſpices of ſeveral princes, acquired almoſt all the advantages of which any city can boaſt. It is ſuppoſed to have been a biſhop's ſee in the fifth century. The firſt archbiſhop was Gregory, in the year 1152; and the biſhopric of Glendaloch was annexed to it in 1214, when Henry de Loundres, or Henry of London, was archbiſhop. He made it a place of ſtrength by building the caſtle; which ſtill remains the centre of the Britiſh force in this place, by the addition of barracks. An univerſity was erected here by the authority of the Pope in 1320; but that not taking effect, queen Elizabeth, in 1591, founded and endowed Trinity college, which has continued ever ſince, and produced many learned men. This city is the ſeat of government; the lord lieutenant, lord deputy, or lords juſtices, reſiding here. Here alſo are kept the ſovereign courts of law and equity, and the records of the kingdom; and here likewiſe is held the parliament. As a city or corporation, its chief magiſtrate is ſtyled *lord mayor*, and wears a collar of SS, both beſtowed by Charles II. Suceeding monarchs have confirmed theſe favours, and moſt extenſive privileges have been granted to the citizens; their liberties alſo, or corporate juriſdiction, being very large. Beſides all this, Dublin may be conſidered as the centre of the inland trade, and is without doubt the place of the ampleſt foreign commerce in the iſland. For the accommodation of merchants, they have a tholſel or exchange; a cuſtomhouſe for the receipt of the revenue; and commiſſioners for the management of it. The city has increaſed prodigiouſly of late. From 1682, to 1752, the number of houſes were completely doubled; and the number of inhabitants is now reckoned at 150,000.—Since the introduction of large veſſels that draw a great deal of water, the harbour of Dublin is but indifferent; for all along this coaſt, from Wexford, there lie ſhoals of ſand, divided into the ſouth, middle, and north grounds; and at the mouth of the harbour there is a bar, occaſioned by two banks of ſand, called the *ſouth* and *north bulls*, ſtretching from the oppoſite ſides of the haven, upon which at high water there is no more than 17 feet, and at low water it is impoſſible to go over it. Beſides, when the tide is out, except in two places, ſhips lie dry. Great pains and much money have been employed with a view to remove theſe inconveniencies, but hitherto not with any great ſucceſs; yet, notwithſtanding all theſe obſtructions, the merchants of Dublin extend their correſpondence daily, and probably one half of the foreign commerce of Ireland is carried on at this port.

DUBOS (John Baptiſt), a learned and ingenious French author, born at Beauvais in 1670. He finiſhed his ſtudies at Paris, and at length was intruſted with the management of ſeveral important affairs in Italy, England, and Holland. At his return to Paris, he had a prebendary given him; afterwards he had a penſion of two thouſand livres, and the abbey of Notre Dame at Reſſons, near Beauvais. He died at Paris, when perpetual ſecretary of the French academy, on the 23d of March 1742. His principal works are, 1. Critical Reflections on Poetry and Painting, in three volumes duodecimo. 2. A critical Hiſtory of the French Monarchy in Gaul, two volumes 4to.

DUCAL, in general, ſomething belonging to a duke. See DUKE.

DUCAS, a learned Greek, who wrote an hiſtory of what paſſed under the laſt emperors of Conſtantinople, till the ruin of that city. This work, which is eſteemed, was printed at the Louvre in 1649, with the Latin tranſlation and notes of Bouillaud.

DUCAT, a coin current in Germany, and other countries abroad, of different values.

DUCATOON, a ſilver coin, likewiſe current in ſeveral parts of Europe.

DUCHAL (James), D. D. a late pious and learned diſſenting miniſter, was born in Ireland, and finiſhed his ſtudies at the univerſity of Glaſgow; which afterwards, from a regard to his merit, conferred on him the degree of doctor of divinity. He reſided 10 or 11 years at Cambridge, as the paſtor of a ſmall congregation there; where he enjoyed his beloved retirement, the advantage of books and of learned converſation, which he improved with the greateſt diligence. On Mr Abernethy's removal from Antrim, he ſucceeded him there; and on that gentleman's death, he ſucceeded him as miniſter of the diſſenting meeting-houſe in Wood-ſtreet, Dublin. In this ſituation he continued till his death, which happened on the 4th of May 1761, when he had completed his 64th year. He publiſhed a volume of excellent diſcourſes on the preſumptive arguments in favour of the Chriſtian religion, and many occaſional tracts; and after his death were publiſhed a number of his ſermons, in three volumes 8vo.

DUCENARIUS, in Roman antiquity, a military officer who had the command of 200 men.

DUCHY, in geography, an appellation given to the dominions of a duke.

DUCK, in ornithology. See ANAS, and DECOY.

This fowl is furniſhed with a peculiar ſtructure of veſſels about the heart, which enables it to live a conſiderable time under water, as is neceſſary for it in diving. This made Mr Boyle think it a more proper ſubject for experiments with the air-pump than any other bird. A full grown duck being put into the receiver of an air-pump, of which ſhe filled one third part, and the air exhauſted, the creature ſeemed to bear it better for the firſt moments than a hen or other ſuch fowl; but, after about a minute, ſhe ſhewed great ſigns of uneaſineſs, and in leſs than two minutes her head fell down, and ſhe appeared dying, till revived by the letting in of the air. Thus, whatever facility of diving this and other water-fowl may have, it does not appear that they can ſubſiſt, without air for reſpiration, any longer than other animals. A young callow duck was afterwards tried in the ſame manner, and with the ſame ſucceſs, being reduced very near death in leſs than two minutes. But it is obſervable, that both birds ſwelled very much on pumping out the air, ſo that they appeared greatly larger to the ſpectators, eſpecially about the crop; it not being intended that any water-fowl ſhould live in an exceedingly rarefied air, but only be able to continue occaſionally ſome time under water. Nature, though ſhe has provided them with the means of this, has done nothing for them in regard to the other.

The ſtrongeſt inſtance of theſe creatures being calculated to live almoſt in any ſituation, we have in the accounts of the blind ducks in the Zirchnitzer lake in Carniola. It is ſuppoſed that this lake communicates with another lake under ground in the mountain Savornic, and fills or empties itſelf according to the fulneſs or emptineſs of that lake; the water of the upper lake running off, and that in vaſt quantities, by holes in the bottom. The ducks, which are here always in great numbers, are often carried down along with the water, and forced into the ſubterraneous lake to which it retires. In this unnatural habitation, many of theſe creatures undoubtedly periſh, but ſome remain alive. Theſe become blind, and loſe all their feathers; and in the next filling of the lake, both they and vaſt numbers of fiſh are thrown up with the water. At this time they are fat, but make a ſtrange appearance in their naked ſtate, and are eaſily caught, by reaſon of their want of ſight. In about a fortnight they recover their ſight and feathers; and are then of the ſize of a common wild-duck, but of a black colour, with a white ſpot in their forehead. When opened, on being taken at their firſt coming up in their blind ſtate, their ſtomachs are found full of ſmall fiſhes, and ſomewhat reſembling weeds. From this it ſeems, that they cannot be abſolutely blind; but that the degree of light to which they have been accuſtomed in their ſubterraneous habitation, was ſufficient to enable them to procure food for themſelves; and their blindneſs, on coming again into open day-light, is no other than that of a man who has been long in the dark, on having in an inſtant a large blaze of candles ſet under his eyes.

Duck (Stephen), originally a threſher in a barn, was born about the beginning of the preſent century. By his poetical talents he firſt attracted the notice of ſome gentlemen at Oxford; and being recommended to Queen Caroline, he, under her patronage, took orders, and was preferred to the living of Byfleet in Surry. His abilities were, however, much more conſpicuous in his primitive ſtation, than in his advancement; though, it is ſaid, he was not diſliked as a preacher. Falling at length into a low-ſpirited melancholy way, probably owing to his change of life, and ceſſation from his uſual labour, he in a fit of lunacy flung himſelf into the Thames, in 1756.

DUCKING, plunging in water, a diverſion anciently practiſed among the Goths by way of exerciſe; but among the Celtæ, Franks, and ancient Germans, it was a ſort of puniſhment for perſons of ſcandalous lives.—At Marſeilles and Bourbon their men and women of ſcandalous life are condemned to the *cale*, as they call it; that is, to be ſhut up naked to the ſhift in an iron cage faſtened to the yard of a ſhallop, and ducked ſeveral times in the river. The ſame is done at Thouloufe to blaſphemers.

Ducking, a ſort of marine puniſhment, inflicted by the French, on thoſe who have been convicted of deſertion, blaſphemy, or exciting ſedition. It is performed as follows: The criminal is placed aſtride of a ſhort thick batten, faſtened to the end of a rope, which paſſes through a block hanging at one of the yard-arm. Thus fixed, he is hoiſted ſuddenly up to the yard, and the rope being ſlackened at once, he is plunged into the ſea. This chaſtiſement is repeated ſeveral times conformable to the purport of the ſentence pronounced againſt the culprit, who has at that time ſeveral cannon-ſhot faſtened to his feet during the puniſhment; which is rendered public by the firing of a gun, to advertiſe the other ſhips of the fleet thereof, that their crews may become ſpectators.

Ducking-*Stool*. See Castigatory.

DUCKUP, at ſea, is a term uſed by the ſteer'sman, when the main-ſail, fore-ſail, or ſprit-ſail, hinders his ſeeing to ſteer by a land-mark: upon which he calls out, *Duckup the clew-lines of theſe ſails*; that is, hale the ſails out of the way. Alſo when a ſhot is made by a chace-piece, if the clew of the ſprit-ſail hinders the ſight, they call out, *Duckup*, &c.

DUCT, in general, denotes any tube or canal. It is a term much uſed by anatomiſts.

DUCTILITY, in phyſics, a property poſſeſſed by certain ſolid bodies, which conſiſts in their yielding to percuſſion, or preſſure, and in receiving different forms without breaking.

Some bodies are ductile both when they are hot and when they are cold, and in all circumſtances. Such are metals, particularly gold and ſilver. Other bodies are ductile only when heated to a ſufficient degree; ſuch as wax and other ſubſtances of that kind, and glaſs. Other bodies, particularly ſome kinds of iron, called by the workmen *red-ſhort*, braſs, and ſome other metallic mixtures, are ductile only when cold, and brittle when hot. The degrees of heat requiſite to produce ductility in bodies of the firſt kind, vary according to their different natures. In general, the heat of the body muſt be ſuch as is ſufficient to reduce it to a middle ſtate betwixt ſolidity and perfect fuſion. As wax, for inſtance, is fuſible with a very ſmall heat, it may be rendered ductile by a ſtill ſmaller one; and glaſs, which requires a moſt violent heat for its perfect fuſion, cannot acquire its greateſt ductility until it is made perfectly red-hot, and almoſt ready to fuſe. Laſtly, ſome bodies are made ductile by the abſorption of a fluid. Such are certain earths, particularly clay. When theſe earths have abſorbed a ſufficient quantity of water, to bring them into a middle ſtate betwixt ſolidity and fluidity, that is to the conſiſtence of a conſiderably firm paſte, they have then acquired their greateſt ductility. Water has preciſely the ſame effect upon them in this reſpect, that fire has upon the bodies above mentioned.

DUDLEY (Edmund), an eminent lawyer and able ſtateſman in the reign of Henry VII.; who with Sir Richard Empſon, another lawyer of the ſame complexion, aſſiſted in filling that rapacious monarch's coffers by arbitrary proſecutions of the people on old penal ſtatutes. They were beheaded on the acceſſion of Henry VIII. to pacify the clamours of the people for juſtice.

Dudley, (John), duke of Northumberland, ſon of the above, a ſtateſman; memorable in the Engliſh hiſtory for his unſucceſsful attempt to place the crown on the head of his daughter-in-law, lady Jane Grey, who fell a victim to his ambition; was born in 1502, and beheaded in 1553. See (*Hiſtory of*) England. Ambroſe his eldeſt ſon was a brave general and able ſtateſman under queen Elizabeth; and received the appellation of *the good earl of Warwick*. Henry, the duke's ſecond ſon, was killed at the ſiege of St Quintin. Robert, the third ſon, a man of bad character, was created earl of Leiceſter; and was one of queen Elizabeth's favourites. His fourth ſon was the unfortunate lord Guildford Dudley, whoſe only crime was his being the huſband of lady Jane Grey, for which he was beheaded in 1554.

Dudley (Sir Robert), as he was called in England, and, as he was ſtyled abroad, *earl of Warwick and duke of Northumberland*, was the ſon of Robert above mentioned, by the lady Douglas Sheffield; and was born at Sheen in Surry, in 1573, where he was carefully concealed, to prevent the queen's knowledge of the earl's engagements with his mother. He ſtudied at Oxford; when his father, dying, left him the bulk of his eſtate. He was at this time one of the fineſt gentlemen in England; and having a particular turn to navigation, fitted out a ſmall ſquadron at his own expence, with which he ſailed to the river Oronooque, and took and deſtroyed nine ſail of Spaniſh ſhips. In 1595, he attended the earl of Eſſex, and the lord high admiral of England, in their expedition againſt the Spaniards; when, for his gallant behaviour at the taking of Cadiz, he received the honour of knighthood. He now endeavoured to prove the legitimacy of his birth, in order to be entitled to his hereditary honours. But being overpowered by the intereſt of the counteſs dowager of Leiceſter, he applied for a licence to travel; and being well received at the court of Florence, reſolved to continue there, notwithſtanding his receiving a letter of recall; on which his whole eſtate was ſeized by king James I. and veſted in the crown. He diſcovered at the court of Coſmo II. great duke of Tuſcany, thoſe great abilities for which he had been admired in England, and was at length made chamberlain to his ſerene highneſs's conſort. He there contrived ſeveral methods of improving ſhipping; introduced new manufactures; and by other ſervices obtained ſo high a reputation, that at the deſire of the archducheſs, the emperor Ferdinand, in 1620, created him a duke of the holy Roman empire. He afterwards drained a vaſt tract of moraſs between Piſa and the ſea; and raiſed Leghorn, which was then a mean, pitiful place, into a large and beautiful town, improving the haven by a mole, which rendered it both ſafe and commodious; and having engaged his highneſs to declare it a free port, he, by his influence and correſpondence, drew many Engliſh merchants to ſettle and ſet up houſes there, which was of very great ſervice to his native country, as well as to the Spaniards. He was alſo the patron of learned men, and held a high place himſelf in the republic of letters. His moſt celebrated work is his *Del Arcano del Mare*, in two volumes, folio.

DUEL, a ſingle combat, at a time and place appointed, in conſequence of a challenge. This cuſtom came originally from the northern nations, among whom it was uſual to decide all their controverſies by arms. Both the accuſer and accuſed gave pledges to the judges on their reſpective behalf; and the cuſtom prevailed ſo far amongſt the Germans, Danes, and Franks, that none were excuſed from it but women, ſick people, cripples, and ſuch as were under 21 years of age, or above 60. Even eccleſiaſtics, prieſts, and monks, were obliged to find champions to fight in their ſtead. The puniſhment of the vanquiſhed was either death, by hanging or beheading; or, mutilation of members, according to the circumſtances of the caſe. Duels were at firſt admitted not only on criminal occaſions, but on ſome civil ones for the maintenance of rights to eſtates, and the like: in latter times, however, before they were entirely aboliſhed, they were reſtrained to theſe four caſes. 1. That the crime ſhould be capital. 2. That it ſhould be certain the crime was perpetrated. 3. The accuſed muſt by common fame be ſuppoſed guilty. And, 4. The matter not capable of proof by witneſſes.

Duel, at preſent, is uſed for ſingle combat on ſome private quarrel; and muſt be premeditated, otherwiſe it is called a *rencounter*. If a perſon is killed in a duel, both the principals and ſeconds are guilty whether the ſeconds engage or not. (See the article Murder.) It is alſo a very high offence to challenge a perſon either by word or letter, or to be the meſſenger of a challenge. (See Law, N° clxxxv. 20.) The ſevere edicts made by Lewis XIV. againſt duels have in a great meaſure put a ſtop to the practice in France.

The general practice of duelling, in this laſt ſenſe, took its riſe in the year 1527, at the breaking up of a treaty between the emperor Charles V. and Francis I. The former deſired Francis's herald to acquaint his ſovereign, that he would henceforth conſider him not only as a baſe violator of public faith, but as a ſtranger to the honour and integrity becoming a gentleman. Francis, too high-ſpirited to bear ſuch an imputation, had recourſe to an uncommon expedient to vindicate his character. He inſtantly ſent back the herald with a *cartel* of defiance, in which he gave the emperor the lie in form, challenged him to ſingle combat, requiring him to name the time and place of the encounter, and the weapons with which he choſe to fight. Charles, as he was not inferior to his rival in ſpirit or bravery, readily accepted the challenge; but after ſeveral meſſages concerning the arrangement of all the circumſtances relative to the combat, accompanied with mutual reproaches bordering on the moſt indecent ſcurrility, all thoughts of this duel, more becoming the heroes of romance than the two greateſt monarchs of their age, were entirely laid aſide.

The example of two perſonages ſo illuſtrious, drew ſuch general attention, and carried with it ſo much authority, that it had conſiderable influence in introducing an important change in manners all over Europe. Duels, as has already been obſerved, had been long permitted by the laws of all the European nations; and, forming a part of their juriſprudence, were authoriſed by the magiſtrate on many occaſions, as the moſt proper method of terminating queſtions with regard to property, or of deciding in thoſe which regarded crimes. But ſingle combats being conſidered as ſolemn appeals to the omniſcience and juſtice of the Supreme Being, they were allowed only in public cauſes, according to the preſcription of law, and carried on in a judicial form[*]. Men, accuſtomed to this manner of deciſion in courts of juſtice, were naturally led to apply it to perſonal and private quarrels. Duels, which at firſt could be appointed by the civil judge alone, were fought without the interpoſition of his authority, and in caſes to which the laws did not extend. The tranſaction between Charles and Francis ſtrongly countenanced this practice. Upon every affront or injury which ſeemed to touch his honour, a gentleman thought himſelf entitled to draw his ſword, and to call on his adverſary to make reparation. Such an opinion, introduced among men of fierce courage, of high ſpirit, and of rude manners, where offence was often given, and revenge was always prompt, produced moſt fatal con-

[*] See the article *Battel*.

conſequences. Much of the beſt blood in Chriſtendom was ſhed; many uſeful lives were loſt; and, at ſome periods, war itſelf hath hardly been more deſtructive than theſe conteſts of honour. So powerful, however, is the dominion of faſhion, that neither the terror of penal laws, nor reverence for religion, have been able entirely to aboliſh a practice unknown among the ancients, and not juſtifiable by any principle of reaſon; though at the ſame time it muſt be admitted, that to this abſurd cuſtom we muſt aſcribe, in ſome degree, the extraordinary gentleneſs and complaiſance of modern manners, and that reſpectful attention of one man to another, which at preſent render the ſocial intercourſes of life far more agreeable and decent than among the moſt civilized nations of antiquity.

DUERO, or Duro, a large river, which, riſing in Old Caſtile in Spain, runs from eaſt to weſt, croſſes the province of Leon, and, after dividing Portugal from Spain by a ſoutherly courſe, turns weſtward, croſſes Portugal, and falls into the Atlantic Ocean at Porto-Port.

DUGDALE (Sir William), an eminent Engliſh hiſtorian, antiquarian, and herald, born in Warwickſhire in 1605. He was introduced into the herald's office by Sir Chriſtopher Hatton; and aſcended gradually through all the degrees, until he became garter principal king at arms. His chief work is the *Monaſticon Anglicanum*, in three vols folio; containing the charters and deſcriptions of all the Engliſh monaſteries, adorned with engravings: in the former part of which work he was aſſiſted by Mr Roger Dodſworth. Nor are his Antiquities of Warwickſhire leſs eſteemed. He wrote likewiſe, among other things of leſs note, the Hiſtory of St Paul's Cathedral; a Hiſtory of Embanking and Draining; a Baronage of England; and completed the ſecond volume of Sir Henry Spelman's Councils, with a ſecond part of his Gloſſary. He died in 1686. His ſon, Sir John, was Norroy king at arms, and publiſhed a Catalogue of Engliſh Nobility: his daughter Elizabeth married the famous Elias Aſhmole.

DUKE is either the title of a ſovereign prince, as the duke of Savoy, Parma, &c. the grand duke of Tuſcany, Muſcovy, &c.; or it is the title of honour and nobility next below princes. The commanders of armies in time of war, the governors of provinces and wardens of marches in times of peace, were called *duces* under the later emperors. The Goths and Vandals divided all Gaul into duchies and counties, the governors of which they ſometimes call *duces*, and ſometimes *comites*. In France, under the ſecond race of kings, though they retained the name and form of ducal government, there were ſcarce any dukes except thoſe of Burgundy, Aquitain, and France.

In Britain, a duke, though, in reſpect of his title of nobility*, he is inferior in point of antiquity to many others, yet is ſuperior in rank to all of them; his being the firſt title of dignity after the royal family. Among the Saxons, the Latin name of dukes, *duces*, is very frequent; and ſignified, as among the Romans, the commanders or leaders of their armies. But after the Norman conqueſt, which changed the military polity of the nation, the kings themſelves continuing for many generations *dukes* of Normandy, they would not honour any ſubject with that title till the time of Edward III.; who claiming to be king of France, and thereby loſing the ducal in the royal dignity, in the 11th year of his reign created his ſon, Edward the black prince, duke of Cornwall: and many, of the royal family eſpecially, were afterwards raiſed to the ſame honour. However, in the reign of Queen Elizabeth, A. D. 1572, the whole order became utterly extinct; but it was revived about 50 years afterwards by her ſucceſſor, who was remarkably prodigal of honours, in the perſon of George Villiers duke of Buckingham.

A duke is created by patent, cincture of ſword, mantle of ſtate, impoſition of a cap and coronet of gold on his head, and a verge of gold put into his hand. His title is Grace; and, in the ſtyle of the heralds, Moſt high, potent, high-born, and noble prince.

DULCIFYING, in chemiſtry, is the ſweetening any matter impregnated with ſalts, by frequently waſhing it in pure water.

DULL, in the menage. The marks of a dull horſe, called by the French *marquis de ladre*, are white ſpots round the eye and on the tip of the noſe, upon any general colour whatſoever. Though the vulgar take theſe ſpots for ſigns of ſtupidity, it is certain they are great marks of the goodneſs of a horſe; and the horſes that have them are very ſenſible and quick upon the ſpur.

DULLART (Heiman), a Dutch painter and poet. He was a pupil to Rembrandt, for whoſe works the few he left are often miſtaken. He died in 1684.

DUMBNESS, the privation of the faculty of ſpeech. The moſt general, or rather the ſole cauſe of dumbneſs, is the want of the ſenſe of hearing. The uſe of language is originally acquired by imitating articulate ſounds. From this ſource of intelligence, deaf people are entirely excluded: they cannot acquire articulate ſounds by the ear: unleſs, therefore, articulation be communicated to them by ſome other medium, theſe unhappy people muſt for ever be deprived of the uſe of language; and as language is the principal ſource of knowledge, whoever has the misfortune to want the ſenſe of hearing, muſt remain in a ſtate little ſuperior to that of the brute creation. Deafneſs has in all ages been conſidered as ſuch a total obſtruction to ſpeech, or written language, that an attempt to teach the deaf to ſpeak or read has been uniformly regarded as impracticable, till Doctor Wallis and ſome others have of late ſhewn, that although deaf people cannot learn to ſpeak or read by the direction of the ear, there are other ſources of imitation, by which the ſame effect may be produced. The organs of hearing and of ſpeech have little or no connection. Perſons deprived of the former generally poſſeſs the latter in ſuch perfection, that nothing further is neceſſary, in order to make them articulate, than to teach them how to uſe theſe organs. This indeed is no eaſy taſk; but experience ſhews that it is practicable. Mr THOMAS BRAIDWOOD, of Edinburgh, is perhaps the firſt who ever brought this ſurpriſing art to any degree of perfection. He began with a ſingle pupil in 1764; and for ſome years paſt, he has taught many people born deaf, to ſpeak diſtinctly, to read, to write, to underſtand figures, the principles of religion and morality, &c. This, at firſt ſight, may appear to be altogether incredible; but the fact is certain. Mr Braidwood has, at preſent, a conſiderable number of deaf pupils, ſome of them above 20 years of age, all making a rapid and amazing progreſs in thoſe uſeful branches of education.

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* See *Nobility*.

Mr Braidwood's principal difficulty, after he had diſcovered this art, was to make people believe in the practicability of it. He advertiſed in the public papers; he exhibited his pupils to many noblemen and gentlemen; ſtill he found the generality of mankind unwilling to believe him. A remarkable inſtance of this incredulity occurred ſome years ago. A gentleman in England ſent a deaf girl of his to Mr Braidwood's care. A year or two afterwards, Mr Braidwood wrote to the father, that his daughter could ſpeak, read, and write diſtinctly. The father returned an anſwer, begging Mr Braidwood's excuſe, as he could not believe it; however, he deſired a friend of his, who was occaſionally going to Edinburgh, to call at Mr Braidwood, and inquire into the truth of what he had wrote him: he did ſo; converſed with Mr Braidwood, ſaw the young lady, heard her read, ſpeak, and anſwer any queſtions he put to her. On his return, he told the father the ſurpriſing progreſs his child had made; but ſtill the father thought the whole an impoſition: the girl herſelf wrote to her father, but he looked upon the letter as a forgery. About this time the father died; and the mother ſent an uncle and couſin of the deaf lady's from Shrewſbury, in order to be ſatisfied of the truth. When they arrived, Mr Braidwood told the girl her uncle and couſin were in the parlour; and deſired her to go and aſk them how they did, and how her mother and other friends did. The friends were aſtoniſhed, and could hardly credit their own ears and eyes.

We have converſed with Mr Braidwood, concerning the nature and method of teaching this wonderful art: he ſeems to be very deſirous of communicating and tranſmitting his diſcovery to poſterity; but ſays, and, from the nature of the thing, we believe it to be true, that he cannot communicate it ſo fully in writing as to enable any other perſon to teach it. The firſt thing in the method is, to teach the pupil to pronounce the ſimple ſounds of the vowels and conſonants. We have even ſeen him performing this operation; but are unable to give a clear idea of it. He pronounces the ſound of *a* ſlowly, pointing out the figure of the letter at the ſame time; makes his pupil obſerve the motion of his mouth and throat; he then put his finger into the pupil's mouth, depreſſes or elevates the tongue, and makes him keep the parts in that poſition; then he lays hold of the outſide of the windpipe, and gives it ſome kind of ſqueeze, which it is impoſſible to deſcribe: all the while he is pronouncing *a*, the pupil is anxiouſly imitating him, but at firſt ſeems not to underſtand what he would have him to do. In this manner he proceeds, till the pupil has learned to pronounce the ſounds of the letters. He goes on in the ſame manner to join a vowel and a conſonant, till at length the pupil is enabled both to ſpeak and read.

That Mr Braidwood is capable of teaching his pupils not only the mere *pronunciation*, but alſo to underſtand the *meaning* of what they read, may be aſcertained by a converſation with any of his pupils. Of this Mr Pennant gives a remarkable inſtance in a young lady of about 13 years of age, who had been ſome time under the care of Mr Braidwood. "She readily apprehended (ſays he) all I ſaid, and returned me anſwers with the utmoſt facility. She read; ſhe wrote well. Her reading was not by rote. She could clothe the ſame thoughts in a new ſet of words, and never vary from the original ſenſe. I have forgot the book ſhe took up, or the ſentences ſhe made a new verſion of; but the effect was as follows:

"*Original paſſage.* Lord Bacon has divided the whole of human knowledge into hiſtory, poetry, and philoſophy; which are referred to the three powers of the mind, memory, imagination, and reaſon.

"*Verſion.* A nobleman has parted the total or all of man's ſtudy, or underſtanding, into An account of the life, manners, religion or cuſtoms of any people or country; verſe, or metre; moral or natural knowledge: which are pointed to the three faculties of the ſoul or ſpirit; the faculty of remembering what is paſt, thought or conception, and right judgment."

It is altogether in vain for us to attempt to ſay any more concerning the mode of operation. Mr Braidwood undertakes every deaf perſon, who is not at the ſame time fooliſh or idiotical. The greateſt misfortune is, that this art is confined to a ſingle man, and that his pupils muſt live in the houſe with him for ſome years. The expence neceſſarily attending education of this kind, excludes all but people in opulent circumſtances from deriving any advantage from it. Mr Braidwood ſays, that the only way for preſerving the art, and communicating it to a number, is to take people in the way of apprentices: this he is unable to do at his own expence. What a pity, that ſuch a curious and uſeful art ſhould live and die with a ſingle man! There are many ſums mortified in this kingdom, both by govenrment and private perſons, for leſs important purpoſes, than the preſervation and extenſion of the art of raiſing a great number of our fellow-creatures from the rank of brutes, to that of reaſonable beings and uſeful members of ſociety.

Periodical DUMBNESS. In the Ephemerides of the Curious, we have an account of a periodical dumbneſs, which had continued for more than 15 years, and had not gone off at the time the account was wrote. The perſon was ſon to an inn-keeper at Jeſing in the duchy of Wirtemberg in Germany. He was one night taken ſo ill after ſupper, that he could neither ſtand nor ſit. He continued, for about an hour, oppreſſed with ſickneſs to ſuch a degree as to be in danger of ſuffocation. At the expiration of this time he grew better; but, during three months, he was much dejected, melancholy, and, at times, fearful. He was then ſuddenly ſtruck dumb, and became unable to pronounce the leaſt word, or form the leaſt ſound, though he could ſpeak very articulately before. The loſs of ſpeech was at firſt inſtantaneous, and continued only a few minutes: but the duration of it began to lengthen every day; ſo that it ſoon amounted to half an hour, two hours, three hours, and at laſt to 23 hours, yet without any order. At laſt the return of ſpeech kept ſo conſtant and regular an order, that, for 14 years together, he could not ſpeak except from noon, during the ſpace of one entire hour, to the preciſe moment of one o'clock. Every time he loſt his ſpeech, he felt ſomething riſe from his ſtomach to his throat. Excepting this loſs of ſpeech, he was afflicted with no other diſorder of any animal function. Both his internal and external ſenſes continued ſound: he heard always perfectly well, and anſwered the queſtions propoſed to him by geſtures or writing. All ſuſpicion of deceit was removed by his keeping exactly the ſame hour, though he had no acceſs to any inſtruments by which time can be meaſured.

DUMFERMLINE, a parliament-town of Scotland, ſituated in the county of Fife, 15 miles north-weſt of Edinburgh: W. Long. 30. 20. N. Lat. 56. 15. Here was formerly a magnificent abbey and palace of the kings of Scotland, in which the princeſs Elizabeth, daughter of king James VI. and mother of the princeſs Sophia, from whom the preſent royal family are deſcended, was born.

DUMFRIES, a county of Scotland, comprehending Annandale, Wachopdale, and Niddiſdale, extends in length from weſt to eaſt about 50 miles, and is about 34 miles in breadth where broadeſt. It is bounded on the weſt by Galloway and Kyle; on the eaſt by Solway frith, and the marches between Scotland and England; on the north by part of Clydeſdale, Tweedale, and Teviotdale; and on the ſouth by the Iriſh ſea. The country is rough and mountainous, not ſo well adapted for corn as for paſture; and, of conſequence, innumerable flocks of ſheep and herds of black cattle are bred in this county, and fattened for exportation to England. The face of the country is bare and brown, almoſt deſtitute of wood, and very deficient in fuel; yet the valleys being watered and fertilized by abundance of ſtreams, produce good corn.—In the diviſion called *Niddiſdale*, are mines of lead, and, as it is ſaid, of ſilver and gold alſo; but the two laſt mentioned are not worked.

Dumfries, the capital of the above-mentioned county, is a large flouriſhing town, ſituated at the mouth of the river Nid, in W. Long. 3. 20. N. Lat. 54. 45. The houſes are well built and commodious, the ſtreets open and ſpacious: The town has an old caſtle in tolerable repair; four gates; a ſtately church; an exchange for the merchants; a tolbooth; a large market-place with a curious croſs; and a noble bridge of free-ſtone over the river, conſiſting of 13 arches, with a gate in the middle as a boundary between the ſhire of Dumfries and the ſtewartry of Galloway. This town gives the title of earl to the chief of the family of Crichton; it is the ſeat of a preſbytery and provincial ſynod, and carries on a conſiderable foreign trade.

DUMONT (Francis), a Frenchman; compiler of a general collection of treaties of commerce, alliance, and peace, between the powers of Europe. This collection, with Barbeyrac's, containing the treaties B. C. makes 16 vols folio, very uſeful for hiſtorical writers. Dumont retired to Holland in 1720. The time of his death is uncertain.

DUMOSÆ, (from *dumus*, a buſh), an order of plants in the *Fragmenta methodi naturalis* of Linnæus, containing the following *genera*, viz. *Viburnum*, *Tinus*, *Opulus*, *Sambucus*, *Rondeletia*, *Bellonia*, *Caſſine*, *Ilex*, *Tomax*, &c.

DUNBAR, a town of Scotland, in the ſhire of Mid-Lothian, memorable for the victory obtained by Oliver Cromwell over the Scots in 1650. W. Long. 2. 22. N. Lat. 55. 58.

DUNBARTON, the chief town of Lenox or Dunbarton-ſhire in Scotland, ſituated in W. Long. 4. 32. N. Lat. 56. 30. It is remarkable for nothing but its caſtle. This is a ſteep rock, riſing up in two points, and every where innacceſſible, except by a very narrow paſſage or entry, fortified with a ſtrong wall or rampart. Within this wall is the guard-houſe, with lodgings for the officers; and from hence a long flight of ſtone-ſteps aſcends to the upper part of the caſtle, where there are ſeveral batteries mounted with cannon, the wall being continued almoſt round the rock. In the middle of this upper part where the rock divides, there are commodious barracks with a deep well, in which there is always plenty of water. Here likewiſe are the remains of a gateway and prodigious high wall, at the top of which there was a wooden bridge of communication from one rock to another. This gateway was ſometimes blocked up during the inteſtine commotions of Scotland, ſo that garriſons of different factions poſſeſſed different parts of the caſtle, and each had a gate towards the water. The caſtle ſtands in the angle formed at the conflux of the Clyde and Leven; ſo that it is wholly ſurrounded by water, except a narrow iſthmus, and even this is overflowed at every ſpring-tide: nor is there any hill or eminence within a Scots mile of this fortreſs. It commands the navigation of the Clyde; and, being deemed the key of the weſtern Highlands, is kept in ſome repair, and garriſoned with invalids, under the command of a governor and ſome ſubaltern officers. The government of it is worth 365 *l.* a-year.

DUNCANNON, a fort in the county of Wexford, and province of Leinſter, in Ireland, ſeated on the river Roſs. It commands the river, inſomuch that no ſhip can paſs to Waterford or Roſs without its permiſſion. Here are barracks for three companies of foot. W. Long. 6. 30. N. Lat. 52. 10.

DUNCARDS, Dunkards, or *Dumplers*, a religious ſect in Penſylvania, in America. A German hermit, who ſettled on the ſpot where Ephrata is now built, was the founder of this extraordinary ſect. The fame of his ſolitude inſpired ſome of his countrymen with curioſity; and the ſimplicity of his life, with the piety of his converſation, induced them to join, and imitate him. A people who leave their native country to enjoy liberty of conſcience, can bear all ſubſequent mortifications. The Germans of both ſexes, who joined the hermit, ſoon accuſtomed themſelves to his way of thinking, and conſequently to his manner of living; induſtry became part of their duty, and divided their time with devotion. Their gains are thrown into one common ſtock, which ſupplies all their exigencies, private as well as public: their females are cloiſtered up by themſelves in a ſeparate part of the town, the ſituation of which is delightful, and ſcreens them from the north wind. It is triangular, and fenced round with thick rows of apple, beech, and cherry trees, beſides having an orchard in the middle. The houſes, which are of wood, are moſtly three ſtories high; and every perſon has a ſeparate apartment, that he may not be diſturbed in his devotions. The women never ſee the men but at public worſhip, or when it is neceſſary to conſult upon matters of public œconomy; and the number of both may be about 300. Their garb is the moſt ſimple that can be well imagined, being a long white woollen gown in winter, and linen in the ſummer, with a cap, which ſerves them for a hat, like that of a capuchin behind, and faſtened round the waiſt with a belt. Under the gown, they wear a waiſtcoat of the

Dunkards, Dundee.

ſame materials, a coarſe ſhirt, trowſers, and ſhoes. The dreſs of the women is the ſame: only, inſtead of trowſers, they wear petticoats; and when they leave their nunnery (for ſuch it is), they muffle up their faces in their capuchins. The diet of the Dunkards conſiſts of vegetables; but it is no principle with them to abſtain from animal-food, only they think that ſuch abſtinence is moſt agreeable to a Chriſtian life. This temperance emaciates their bodies, and, as the men indulge their beards to grow to their full length, gives them a hollow, ghaſtly appearance. Their beds are no better than benches; a little wooden block ſerves them for a pillow; and they celebrate public worſhip twice every day, and as often every night. But though ſuch modes of life appear abſurd and impracticable, the Dunkards are far from being extravagant. Their chapel is very decent; and they have, upon a fine ſtream, a griſt-mill, a paper-mill, an oil-mill, and a mill for pearl-barley, all of them moſt ingeniouſly conſtructed by themſelves: they have even a printing-preſs; and they are, eſpecially the nuns, extremely ingenious in working, and in embelliſhments; which they perform with a variety of beautiful colours, with gilding, in imitation of the initials in ancient manuſcripts; and they ſtick them up, by way of ornament, in their churches and cells. By thoſe different manufactures, the public ſtock of this aſcetic people is well ſupplied, as no denomination of Chriſtians can be their enemies, their religious tenets being mingled with the abſurdities of all. Notwithſtanding the two ſexes live ſeparate from one another in their town, yet the Dunkards are far from being averſe to matrimony. In that caſe, the parties muſt indeed leave the town; but they are ſupplied out of the public fund with whatever is neceſſary for their ſettling elſewhere. This they generally do as near as they can to Ephrata, to which they ſend their children for education. The Dunkards adminiſter baptiſm by dipping or plunging, but to adult perſons only: they hold free-will; and think that the doctrine of original ſin, as to its effect upon Adam's poſterity, is abſurd and impious: they diſclaim violence, even in caſes of ſelf-defence; and ſuffer themſelves to be defrauded or wronged, rather than go to law: they are ſuperſtitious to the laſt degree in obſerving their ſabbath; and all their prayers and preachings, during their worſhip, are extempore: humility, chaſtity, temperance, and other Chriſtian virtues, are commonly the ſubjects of their diſcourſes; and they imagine, that the ſouls of dead Chriſtians are employed in converting thoſe of the dead who had no opportunity of knowing the goſpel: they deny the eternity of hell-torments; but believe in certain temporary ones, that will be inflicted on infidels and obſtinate perſons who deny Chriſt to be their only Saviour; but they think, that at a certain period all will be admitted to the endleſs fruition of the Deity.

DUNDEE, the ALLECTUM or *Taiodunum* of the ancients; a well-built, flouriſhing town of Scotland, in the ſhire of Angus or Forfar, and ranking the 3d of the royal boroughs. It is ſeated on the north-ſide of the river Tay, about eight miles from its mouth, in W. Long. 2. 48. N. Lat. 56. 26. Its ſituation for commerce is very advantageous: trading veſſels of the largeſt burden can get into its harbour; and on the key there are three very convenient and handſome warehouſes, built in 1756; as well as good room for ſhip-building, which is carried on to a conſiderable extent. The houſes are built of ſtone, generally four ſtories high. The market-place, or high-ſtreet, in the middle of the town, is a very ſpacious ſquare, from whence branch out the four principal ſtreets; which, with ſeveral leſſer ones, have been all lately well paved. On the ſouth-ſide of the market-place, ſtands the town-houſe, an elegant ſtructure, finiſhed in the year 1734: it contains the guild-hall, the court-room, a finely painted maſon-lodge, the poſt-office, the bank, and vaulted repoſitories for the records. At the eaſt end of the high-ſtreet, there is a fine new edifice, erected principally for a trades-hall, but deſigned alſo to anſwer occaſionally for a theatre. Three eſtabliſhed churches, beſides ſeveral chapels and meeting-houſes, having been found inſufficient for the number of inhabitants, a new church has been lately built, which is reckoned one of the moſt elegant in the kingdom.—Here is alſo a magnificent ſquare Gothic tower or ſteeple, now ſtanding by itſelf, but which formerly made part of a venerable and ſuperb building of churches in the form of a croſs, erected by David earl of Huntingdon brother to William I. of Scotland, and dedicated to the Virgin Mary. This he did on his return from the third cruſade, (in which, with 500 of his countrymen, he had accompanied Richard I. of England, *anno* 1189), in gratitude for his deliverance from ſeveral imminent dangers; and particularly from ſhipwreck, by which he had nearly periſhed when in ſight of this place. At the ſame time he changed the name of the town from *Allectum* to *Dei Donum*, from which its preſent name is thought by many to be derived; and under this new name we find it increaſing conſiderably in the 13th century. The deſtruction of the churches adjoining to this tower, was the work of Edward I. of England, that barbarous deſtroyer of Scottiſh monuments and records. He was ſo exaſperated at the inhabitants ſtanding out againſt him, and aiding his inveterate foe the famous Wallace, that he ſet fire both to the churches and to the town itſelf; the flames deſtroying all but a part on the eaſt end, now called the *old kirk*. The town ſuffered very much about the middle of the laſt century. For juſt ſix years after it had been taken by ſtorm by Montroſe, it was beſieged in form by General Monk: and although it made a gallant defence under major-general Lumſden, it was at laſt, on the 1ſt of September 1651, carried by force, when all that were in arms were put to the ſword; and ſo great were the riches of the town, all the neigbouring gentlemen with their beſt effects having retired to it as a place of ſafety, that every private ſoldier in general Monk's army had near 60 pounds Sterling to his ſhare of the plunder. This is reckoned the greateſt loſs ever Scotland ſuſtained at one ſtroke, there being above 60 veſſels in the harbour at that time. To enable the inhabitants to recover from this calamity, and to repair their harbour and other public works, Charles II. granted them an exciſe of one third of an Engliſh penny upon every gallon of ale or beer ſold in town for 25 years, which has been continued by five ſubſequent acts, and is highly ſerviceable. At preſent Dundee is in a very flouriſhing condition. The ſhipping are reckoned near 100 ſail; and the manufactures go on briſkly. Theſe

Dundee.

conſiſt of linen (eſpecially oſnaburghs), ſail-cloth, cordage, threads, thread-ſtockings, buckrams (a new work in Scotland), tanned leather, ſhoes, and hats; not only ſufficient for their own conſumpt, but for exportation in conſiderable quantities. An excellent ſugar-houſe has alſo now ſubſiſted for about 10 years, and does conſiderable buſineſs. The Oſnaburgh trade is undoubtedly the ſtaple, of which there have been above four millions of yards ſtamped here annually of late. Their coloured threads have been long famous; and are manufactured to a conſiderable amount. The number of inhabitants is reckoned near 16,000.

DUNG, in huſbandry. See AGRICULTURE, n° 21.

DUNG-*Bird*. See UPUPA.

DUNG *Meers*, in huſbandry, places where ſoils and dungs are mixed and digeſted together. Theſe conſiſt of pits, prepared at the bottom with ſtone and clay, that they may hold water, or the moiſture of the dung; and ought to be ſo ſituated, that the ſinks and drips of the houſes and barns may run into them. Into theſe pits they caſt refuſe, fodder, litter, dung, weeds, &c. where they lie and rot together, till the farmer have occaſion for them.

DUNG-*Worms*, a ſpecies of fly-worms, of a ſhort and ſomewhat flat body, found in great plenty among cow-dung in the months of September and October.

DUNGANNON, the chief town of the county of Tyrone, in the province of Ulſter, in Ireland. It is ſeated on a hill, and is a place of ſome ſtrength.

DUNGARVON, a town of Ireland, in the county of Waterford. It ſtands on a bay of the ſame name, has a commodious harbour for ſhips, and is a walled town with a caſtle. W. Long. 7. 55. N. Lat. 51. 57.

DUNKELD, a town of Scotland, in the ſhire of Perth, pleaſantly ſituated on the north ſide of the river Tay. It was formerly a biſhop's ſee, and the remains of the cathedral are ſtill viſible. It is the chief market-town of the Highlands. W. Long. 3. 18. N. Lat. 56. 36.

DUNKIRK, a maritime town of the French Netherlands, ſituated in E. Long. 2. 28. N. Lat. 51. 10. and is the moſt eaſterly harbour on the ſide of France which is next to Great Britain.—It was originally a mean hamlet, conſiſting only of a few fiſhermens huts: but a church being built there, it was from that, and from its ſituation, which is a ſandy eminence, called *Dunkirk; dun* ſignifying, in the old Gallic language, a hill; and *kirk* being the old Flemiſh name for church.

About the year 960, Baldwin, earl of Flanders, thinking the ſituation convenient, enlarged it into a kind of town, and ſurrounded it with of wall. In the year 1322, Robert of Flanders, who held it as an appendage, built a caſtle for its defence; which was afterwards demoliſhed by the revolters of Flanders. Robert of Bar erected a fortification round it, the remains of which are viſible on the ſide next the harbour. The emperor Charles V. who held it as part of Flanders, built another caſtle to defend the harbour: but this was alſo demoliſhed ſoon afterwards. In 1558, the French, under marſhal de Thermes, took Dunkirk by ſtorm, and almoſt ruined the place; the Spaniards recovered it again in about a fortnight, and put all the French to the ſword.

During a peace procured for the Dunkirkers by Philip II. of Spain, they rebuilt their town with greater ſplendor than before, and the inhabitants for a long time ſubſiſted by privateers fitted out againſt the Dutch; and at length, growing rich by theſe hoſtilities, they fortified their town and harbour, and fitted out no leſs than 15 ſhips of war at their own charge.

In 1634, the Dunkirkers agreed with the inhabitants of Bergues, to dig a canal, at their joint expence, for a communication between the two towns; which was ſome time afterwards effected. By this time, Dunkirk was become the beſt harbour the Spaniards poſſeſſed in Flanders, which induced many foreigners to ſettle there; and it being neceſſary to enlarge the town for their accommodation, a new fortified wall was built at a conſiderable diſtance from the former. In 1646, it was beſieged and taken by the prince of Condé. In 1652, it was retaken by the archduke Leopold, then governor of the Netherlands. France entering into a treaty with England in 1655, the Dunkirkers, with views of pecuniary advantage, fitted out privateers againſt both thoſe powers: the conſequence of which was, that the French, aſſiſted by Cromwell, attacked and took it; and it was put into the hands of the Engliſh, in conſequence of a treaty between them and the French. To the Engliſh it was even then of very great importance; for, during the war in which it was taken, the Dunkirkers had made prizes of no leſs than 250 of their ſhips, many of which were of great value. They therefore improved the fortifications, and built a citadel: yet they kept it only four years; for in 1662, two years after the reſtoration, Charles II. ſold this valuable acquiſition to France, for the paltry ſum of 500,000*l.* In conſequence of this ſale, the town was taken poſſeſſion of for the French king Lewis XIV. by the count d'Eſtrades, on the 29th of November 1662. Lewis having acquainted the celebrated engineer Monſieur Vauban, that he intended to make Dunkirk one of the ſtrongeſt places in Europe, Vauban drew up a plan with that view, which was gradually executed. An arſenal was erected, large enough to contain all the ſtores neceſſary for fitting out and maintaining a large fleet of men of war; the fortifications on the land-ſide were conſtructed in a manner that was thought to render them impregnable; and towards the ſea, the entrance of the harbour being properly formed, it was fortified by the jetties, and the two forts called *Green-Fort* and the *Fort of Good Hope* at their extremities; the famous Riſbank was alſo erected on one ſide of the jetties, and Fort Galliard on the other, to ſecure the town. Theſe works were all completed in 1683; and in 1685, the whole circumference of the baſon was faced with maſonry, and the keys completely formed: at the ſame time care was taken to build at the entrance of this baſon a ſluice, almoſt 45 feet wide, that the ſhips within might be conſtantly afloat. In 1689, the fort called the *Cornichon*, and ſome other works, were completed. But though 30 years had been now employed in improving the fortifications of Dunkirk, it was not yet in the ſtate in which Lewis intended to put it; and therefore, in 1701, he cauſed a new riſbank to be built, called *Fort Blanc*.

At the treaty of Utrecht, it having been made appear, that the privateers of Dunkirk had, during the war then cloſing, taken from the Engliſh no leſs than 1614 prizes, valued at 1,334,375*l.* Sterling, it was ſtipulated, that the fortifications of the city and port of Dunkirk ſhould be entirely demoliſhed, and the harbour filled up, ſo as never to be an harbour again.

The treaty, of which this demolition of Dunkirk was an article, was ſigned on the 28th of April 1713; but the demolition did not take place till the September following, when the queen deputed colonel Armſtrong and colonel Clayton to overſee the execution of the treaty as far as concerned the works and harbour of Dunkirk.

Under the inſpection of theſe gentlemen, the places of arms were broken down, the ditches filled up, and the demi-lunes, baſtions, and covered way, totally deſtroyed; the citadel was razed, and the harbour and baſon filled up; the jetties were alſo levelled with the ſtrand, and all the forts which defended the entrance into the harbour were demoliſhed. A large dam, or bar, was alſo built acroſs the mouth of the harbour between the jetties and the town, by which all communication between the harbour and the canal, which formed its entrance, was entirely cut off. The ſluices were alſo broken up, and the materials of them broken to pieces.

But this was no ſooner done, than Lewis XIV. ordered 30,000 men to work inceſſantly upon a new canal, the canal of Mardick, which in a ſhort time they accompliſhed; by which the harbour was rendered almoſt as commodious as ever: but in 1717 this likewiſe was rendered unſerviceable.

In the year 1720, during a great ſtorm, the ſea broke up the bar or dam, and reſtored to the Dunkirkers the uſe of the harbour in a very conſiderable degree.

In the year 1740, when Great Britain was engaged in a war with Spain, Lewis XV. ſet about improving the advantage which Dunkirk had derived from the ſtorm in 1720, by reſtoring the works, and repairing the harbour. He rebuilt the jetties, and erected new forts in the place of thoſe which had been deſtroyed; and ſoon afterwards he eſpouſed the cauſe of Spain, and became a principal in the war againſt us.

But at the peace of Aix-la-Chapelle in 1748, it was ſtipulated, that all the works towards the ſea ſhould be deſtroyed a ſecond time; yet, before the declaration of the laſt war, the place was in as good a ſtate of defence towards the ſea as it was at any time during the war which was concluded by the treaty of Aix-la-Chapelle.

DUNS, a market-town of Scotland, in the ſhire of Mers, ſeated in W. Long. 2. 15. N. Lat. 55. 42.

DUNS SCOTUS (John), a Franciſcan friar, commonly called *doctor ſubtilis*, was born in the year 1274; but whether in England, Scotland, or Ireland, hath long been a matter of diſpute among the learned of each nation. Dempſter, Mackenzie, and other Scottiſh writers, aſſert poſitively that he was born at Duns, a town in Scotland, about fifteen miles from Berwick; and, to ſecure him more effectually, Mackenzie makes him deſcended from the Dunſes in the Mers. Mac Caghwell, an Iriſh author, who wrote the life of this Scotus, proves him to have been born at Down in the province of Ulſter in Ireland: but Leland, Bale, Camden, and Pits, aſſure us, that he was born at Dunſtone in the pariſh of Emildune, near Alnwick in Northumberland; and this opinion is rendered probable by the following concluſion of his manuſcript works in the library of Merton college in Oxford—"Here end the writings of that ſubtile doctor of the univerſity of Paris, John Duns, who was born in a certain village, in the pariſh of Emildune, called *Dunſton*, in the county of Northumberland." We are told, that, when a boy, he became accidentally known to two Franciſcan friars; who, finding him to be a youth of very extraordinary capacity, took him to their convent at Newcaſtle, and afterwards perſuaded him to become one of their fraternity. From thence he was ſent to Oxford, where he was made fellow of Merton college and profeſſor of divinity; and Mackenzie ſays, that not leſs than 30,000 ſtudents came to Oxford to hear his lectures. His fame was now become ſo univerſal, that the general of his order commanded him to go to Paris, that the ſtudents of that univerſity might alſo profit from his lectures. He went to Paris in the year 1304, where he was honoured firſt with the degree of bachelor, then of doctor of divinity, and in 1307 was appointed regent of the divinity ſchools: during his reſidence here, the famous controverſy about the *Immaculate conception of the virgin Mary* aroſe. Albertus Magnus maintained that ſhe was born in original ſin. Scotus advanced 200 arguments in ſupport of the contrary opinion, and convinced the univerſity of Paris that ſhe was really conceived immaculate. This important nonſenſe, however, continued to be diſputed till the year 1496, after the council of Baſil, when the univerſity of Paris made a decree, that no ſtudent, who did not believe the *immaculate conception*, ſhould be admitted to a degree. Our author had not been above a year at Paris, when the ſame general of the Franciſcans ordered him to remove to Cologne; where he was received with great pomp and ceremony by the magiſtrates and nobles of that city, and where he died of an apoplexy ſoon after his arrival, in the year 1308, in the 34th year of his age. Some writers have reported, that Scotus was buried in an epileptic fit; and that, upon removing his bones, he appeared to have turned himſelf in his coffin. This *doctor ſubtilis* was doubtleſs one of the firſt wranglers of his time, admirably well verſed in ſcholaſtic divinity, and a moſt indefatigable ſcribbler; but the misfortune is, that all his huge volumes do not contain a ſingle page worth the peruſal of a rational being. He was the author of a new ſect of ſchoolmen called *Scotiſts;* who oppoſed the opinions of the Thomiſts, ſo called from St Thomas Aquinas. The reader will find a more particular account of Scotus in the Franciſcan Martyrology, publiſhed at Paris in 1638.—He was a moſt voluminous writer; his works making 12 vols folio, as publiſhed at Lyons by Luke Wadding, 1639.

DUNSTABLE, a town in Bedfordſhire, with a market on Wedneſdays. It is ſeated on a chalky hill; and has ponds in the ſtreet, which are never dry, tho' only ſupplied with rain water. It is remarkable for ſeveral good inns, it being a great thoroughfare on the northern road. It conſiſts of four ſtreets, interſecting each other at right angles; and in the centre ſtood one of thoſe beautiful croſſes of queen Eleanor, which was deſtroyed by the enthuſiaſts in the time of the civil wars. W. Long. 0. 29. N. Lat. 51. 50.

DUNSTAN (canonized), archbiſhop of Canterbury, in the reign of king Edwy, who was obliged to baniſh him for his overbearing inſolence. He was an encourager of learning, and an author of ſome note for the age he lived in. He died about 988. There are many legendary ſtories about his conteſts with the devil.

DUO, in muſic, a ſong or compoſition, to be performed in two parts only, one ſung, the other played on an inſtrument, or by two voices.

Duo is alſo when two voices ſing different parts, as accompanied with a third which is a thorough baſs. It is ſeldom that uniſons and octaves are uſed in duos, except at the beginning and end.

DUODECIMA, in muſic, is the twelfth, or the fifth doubled.

DUODENUM. See Anatomy, n° 354, g.

DUPIN (Lewis Ellis), a learned doctor of the Sorbonne, and one of the greateſt critics of his time, eſpecially in eccleſiaſtical matters, was born at Paris in 1657. When he publiſhed the firſt volume of his *Bibliotheque Univerſelle des Auteurs Eccleſiaſtiques*, in 1686, the liberty with which he treated ſome eccleſiaſtical writers, gave ſuch offence, that M. de Harlay, archbiſhop of Paris, obliged Dupin to retract many propoſitions, and ſuppreſſed the work. He was nevertheleſs ſuffered to continue it, by altering the title from *Bibliotheque Univerſelle*, to *Bibliotheque Nouvelle*. This great undertaking, continued in ſeveral ſucceſſive volumes, though ſufficient to occupy the life of an ordinary man, did not hinder M. Dupin from obliging the world with ſeveral other works. He was a man of prodigious reading; and had an eaſy, happy way of writing, with an uncommon talent at analyſing the works of an author; which makes his Eccleſiaſtical Bibliotheque ſo valuable. M. Dupin was profeſſor of philoſophy in the royal college; but was baniſhed ſome time from the chair to Chatellerault, on account of the famous *Cas de Conſcience;* but was reſtored, and died in 1719.

DUPLE, among mathematicians, denotes the ratio of 2 to 1. Thus the ratio of 8 to 4 is duple, or as 2 to 1.

Sub-Duple *Ratio*, is juſt the reverſe of the former, or as 1 to 2. Such is 4 to 8, or 6 to 12.

DUPLICATE, among lawyers, denotes a copy of any deed, writing, or account. It is alſo uſed for the ſecond letters-patent, granted by the lord chancellor in a caſe wherein he had before done the ſame. Alſo a ſecond letter written and ſent to the ſame party and purpoſe as a former, for fear of the firſt's miſcarrying, is called a *duplicate*.

Duplicate *Proportion*, or *Ratio*. See Ratio.

DUPLICATION, in general, ſignifies the doubling of any thing, or multiplying of it by 2: alſo the folding of any thing back again on itſelf.

DUPLICATURE, among anatomiſts, a term uſed to denote the folds of any membrane, or veſſel: thus we ſay, the *duplicatures of the inteſtines*, *peritonæum*, &c.

DUPONDUS, in antiquity, the weight of two pounds: alſo a piece of money equal to two aſes in value.

DUPPA (Brian), a learned Engliſh biſhop born in 1589 at Lewiſham in Kent, of which place his father was then vicar. In 1634, he was inſtituted chancellor of the church at Sarum, and ſoon after made chaplain to Charles I. He was appointed tutor to Charles prince of Wales, and his brother James duke of York; was made biſhop of Chicheſter; and in 1641 tranſlated to Saliſbury, though the confuſions that followed deprived him of all benefit from his promotion. Charles I. held him in high eſteem, and he is ſaid to have aſſiſted the king in compoſing the *Eikon Baſilike*. On the Reſtoration he was made biſhop of Wincheſter, and lord high almoner; but died in 1662. He bequeathed large ſums to charitable purpoſes; and publiſhed a few ſermons, with other religious pieces.

DURANDUS (William), born at Puimoiſſion in Provence, in the 13th century, was one of the moſt knowing lawyers of his time. Pope Martin made him one of his nuncios, and then biſhop of Mende and Languedoc. His *Speculum Juris* gave him the name of *Speculator;* his ſecond piece was *Rationale divinorum officiorum*, containing eight books. He wrote ſeveral others.

DURATION. See Metaphysics, n° 60, 61.

Duration, as marked by certain periods and meaſures, is what we moſt properly call *time*. See Time.

Duration *of Action*, according to Ariſtotle, is confined to a natural day in tragedy; but the epopea, according to the ſame critic, has no fixed time *.

DURER (Albert), deſcended of an Hungarian family, and born at Nuremberg in 1471, was one of the beſt engravers and painters of his age. He was at the ſame time a man of letters and a philoſopher; and he was an intimate friend of Eraſmus, who reviſed ſome of the pieces which he publiſhed. He was a man of buſineſs alſo, and for many years the leading magiſtrate of Nuremberg. Though not the inventor, he was one of the firſt improvers of the art of engraving; and he bethought himſelf of working alſo in wood, for expedition, having an inexhauſtible fund of deſigns. In many of thoſe prints which he executed on copper, the engraving is elegant to a great degree. His *Hell-Scene* particularly, which was engraved in the year 1513, is as highly finiſhed a print as ever was engraved, and as happily executed. In his wooden prints too we are ſurpriſed to ſee ſo much meaning in ſo early a maſter; the heads ſo well marked, and every part ſo well executed.—This artiſt ſeems to have underſtood the principles of deſign. His compoſition, too, is often pleaſing; and his drawing generally good. But he knows very little of the management of light; and ſtill leſs of grace: and yet his ideas are purer and more elegant than we could have ſuppoſed from the aukward archetypes which his country and education afforded. In a word, he was certainly a man of a very extenſive genius; and, as Vaſari remarks, would have been an extraordinary artiſt, if he had had an Italian inſtead of a German education. His prints are very numerous. They were much admired in his own life-time, and eagerly bought up; which put his wife, who was a teazing woman, upon urging him to ſpend more time upon engraving than he was inclined to do. He was rich; and choſe rather to practiſe his art as an amuſement, than as a buſineſs. He died in the year 1527.

D'URFEY (Thomas), an eminent Engliſh ſatyriſt and ſongſter, whoſe name, though as well known as that of any writer extant, yet there are very few particulars of his life to be collected. He was born in Devonſhire; but when, where, or of what family, are all uncertain. He was bred to the law, which he forſook for the more agreeable employment of writing plays and ſongs; and the latter he had ſo happy a talent both of writing and ſinging, that he received many favours from perſons of quality on that account. Even crowned heads did not diſdain his company. The writer of the Guardian, N° 67. tells us, he has remembered to have ſeen Charles II. leaning on Tom D'Urfey's ſhoulder more than once, humming over a ſong with him. This indeed was not extraordinary in ſo merry a monarch; but even the phlegmatic king William could relax his muſcles on hearing him ſing. He was certainly, by all accounts, a cheerful, honeſt, good-natured man: but as this character does not include prudence, D'Urfey grew poor as he grew old; and prevailing on the managers of the play-houſe to act his comedy of the *Plotting Siſters* for his benefit, Mr Addiſon wrote the abovementioned paper in the Guardian, with another, N° 82. repreſenting him in a good-humoured light, to procure him a full houſe. He died very old, in 1723.

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* See Poetry, chap. ii.

DURHAM, (biſhopric of), one of the counties of England. It lies between Cumberland and Yorkſhire, being bounded on the weſt by part of Cumberland and Weſtmoreland, and on the eaſt waſhed by the German ocean. It is 39 miles long and about 35 broad, of a triangular ſhape, the baſis being formed by the ſea-coaſt; and contains 52 pariſhes, four wakes, one city, eight market-towns, a conſiderable number of villages and villas, and about 100,000 inhabitants. The climate varies in different parts. Towards the weſt, among the inland hills, the air is keen, pure, and penetrating; on the ſea-ſide more ſoft, though not ſo wholeſome. The county is watered by 16 rivers, ſome of which are navigable by boats and lighters; and moſt of them abound with trout, pike, and ſalmon. The face of the country is agreeably diverſified with hill and dale, wood and water; and, except in the weſtern part, where there is a great number of naked hills, it generally exhibits the appearance of extraordinary cultivation and fertility. The ſoil in the hilly parts is barren; but the plains are remarkably fruitful. It produces corn and cattle in great abundance and perfection. The mountains yield iron, vitriol, and a conſiderable quantity of lead; and almoſt every part of the biſhopric affords plenty of coal, which employs a great number of hands and veſſels.

Durham is a county palatine, governed by the biſhop, who had formerly great prerogatives. He had power to create barons, appoint judges, convoke parliaments, raiſe taxes, and coin money. The courts of juſtice were kept in his name; and he granted pardons for treſpaſſes, alienations, rapes, murders, and felonies of every denomination. He erected corporations, granted markets and fairs, created officers by patent, was lord admiral of the ſeas and waters within the county palatine: great part of the lands were held of the ſee *in capite*. In a word, he exerciſed all the power and juriſdiction of a ſovereign prince. How and at what period theſe prerogatives were obtained, it is not eaſy to determine. Malmeſbury ſays, the lands were granted by king Alfred, who likewiſe made the church a ſanctuary for criminals. This ſee was anciently called the *patrimony of St Cuthbert*, who had been biſhop of Landisfarne or Holy Iſland near Berwick. His bones being transferred to Durham, were long eſteemed as precious relics; and the people of the county conſidered themſelves as Halwerk men, exempted from all other but holy work, that is, the defence of St Cuthbert's body. Certain it is, they pretended to hold their lands by this tenure; and refuſed to ſerve out of the county either for the king or biſhop: but king Edward I. broke through theſe privileges, and curtailed the prerogatives of the biſhops, which were ſtill further abridged by Henry VIII. Nevertheleſs, the biſhop is ſtill earl of Sadberg, a place in this county, which he holds by barony. He is ſheriff paramount, and appoints his own deputy, who makes up his audit to him, inſtead of accounting to the exchequer. He has all the forfeitures upon outlawries; and he and his temporal chancellor act as juſtices of the peace for the county palatine, which comprehends Creke in Yorkſhire, Bedlington, Northam, and Holy Iſland, in Northumberland, the inhabitants of theſe places having the benefit of the courts at Durham. The judges of aſſize, and all the officers of the court, have ſtill their ancient ſalaries from the biſhop; and he conſtitutes the ſtanding officers by his letters patent. He has the power of preſiding in perſon in any of the courts of judicature. Even when judgment of blood is given, this prelate may ſit in court in his purple robes, tho' the canons forbid any clergyman to be preſent in ſuch caſes: hence the old ſaying, *Solum Dunelmenſe ſtola jus dicet et enſe*. It was not till the reign of Charles II. that the biſhopric ſent repreſentatives to parliament. At preſent it ſends only four; two knights for the ſhire, and two burgeſſes for the city.

DURHAM, the capital of the above mentioned county, is ſituated in W. Long. 1. 14. N. Lat. 54. 50. It ſtands on a hill almoſt ſurrounded by the river Were; and is conſiderable for its extent and the number of its inhabitants, as well as for being the ſee and ſeat of the biſhop, who is lord paramount. It ſtands about 280 miles north from London; being remarkable for the ſalubrity of its air, and the abundance and cheapneſs of its proviſions. Theſe circumſtances have induced a great deal of good company to take up their reſidence at Durham, which is ſtill further animated by the preſence and court of the biſhop and his clergy. The town is ſaid to have been built about 70 years before the Norman conqueſt, on occaſion of bringing hither the body of St Cuthbert. It was firſt incorporated by king Richard I. but queen Elizabeth extended its privileges. At length, in the year 1684, it obtained a charter; in conſequence of which, it is now governed by a mayor, 12 aldermen, 12 common council men, with a recorder, and inferior officers. Theſe can hold a court-leet and court-baron within the city; but under the ſtyle of the biſhop, who as count palatine appoints a judge, ſteward, ſheriffs, and other inferior magiſtrates. The mayor and aldermen alſo keep a *pie poudres* court at their fairs, and pay a yearly toll to the biſhop. They have a weekly market on Saturday, and three annual fairs. Durham is about a mile in length, and as much in breadth, reſembling the figure of a crab, the market-place exhibiting the body, and the claws being repreſented by the ſtreets, which bend according to the courſe of the river, that almoſt ſurrounds one part of the city. They are, moreover, dark and narrow; and ſome of them lying on the acclivity of a ſteep hill, are very difficult and dangerous to wheel-carriages. The houſes are in general ſtrong built, but neither light nor elegant. The moſt remarkable edifices are the cathedral with ſix other churches, three ſtanding in the city, and as many in the ſuburbs; the college; the caſtle, or biſhop's palace; the tolbooth near St Nicholas's church; the croſs and conduit in the market-place; with two bridges over the Elvet. The cathedral was begun by biſhop Carilepho in the 11th century. It is a large, magnificent, Gothic ſtructure, 411 feet long, and 80 in breadth, having a croſs aile in the middle 170 feet in length, and two ſmaller ailes at each end. On the ſouth-ſide is a fine cloiſter; on the eaſt, the old library, the chapter-houſe, and part of the deanery; on the weſt, the dormitory, under which is the treaſury and a chantry; and on the weſt ſide is the new library, an elegant building begun by dean Sudbury about 70 years ago, on the ſpot where ſtood the old refectory of the convent. The middle tower of the cathedral is 212 feet high. The whole building is arched and ſupported by huge pillars. Several of the windows are curiouſly painted; and there is a handſome ſcreen at the entrance into the choir. Sixteen biſhops are interred in the chapter-houſe, which is 75 feet long and 33 broad, arched over-head, with a magnificent ſeat at the upper end for the inſtalment of the biſhops. The conſiſtory is kept in the chapel or weſt aile called *Galilee*, which was built by biſhop Pudſey, and had formerly 16 altars for women, as they were not allowed to advance farther than the line of marble by the ſide of the font; here likewiſe are depoſited the bones of the venerable Bede, whoſe elogium is written on an old parchment ſcroll that hangs over his tomb. The long croſs aile, at the extremity of the church, was formerly diſtinguiſhed by nine altars, four to the north, and four to the ſouth, and the moſt magnificent in the middle dedicated to the patron St Cuthbert, whoſe rich ſhrine was in this quarter, formerly much frequented by pilgrims. The church is poſſeſſed of ſome old records relating to the affairs of Scotland, the kings of which were great benefactors to this cathedral. The ornaments here uſed for adminiſtering the divine offices, are ſaid to be richer than thoſe of any other cathedral in England. Before the reformation, it was diſtinguiſhed by the name *eccleſia ſanctæ Mariæ et ſancti Cuthberti;* but it obtained the appellation of *eccleſia cathedralis Chriſti et beatæ Mariæ*, in the reign of Henry VIII. who endowed the deanery with 12 prebendaries, 12 minor canons, a deacon, ſub-deacon, 16 lay ſinging men, a ſchoolmaſter and uſher, a maſter of the choir, a divinity reader, eight alms-men, 18 ſcholars, 10 choiriſters, two vergers, two porters, two cooks, two butlers, and two ſacriſtans. On the ſouth-ſide of the cathedral, is the college; a ſpacious court formed by the houſes of the prebendaries, who are richly endowed and extremely well lodged. Above the college-gate, at the eaſt end, is the exchequer; and at the weſt, a large hall for entertaining ſtrangers, with the granary and other offices of the convent. The college-ſchool, with the maſter's houſe, ſtands on the north ſide of the cathedral. Between the churchyard and caſtle, is an open area called the *palace-green;* at the weſt end of which ſtands the ſhire-hall, where the aſſizes and ſeſſions are held for the county. Hard by is the library built by biſhop Coſin; together with the exchequer raiſed by biſhop Nevil, in which are kept the offices belonging to the county-palatine court. There is an hoſpital on the eaſt, endowed by biſhop Coſin, and at each end of it are two ſchools founded by biſhop Langley. On the north, is the caſtle built by William the Conqueror, and afterwards converted into the biſhop's palace, the outward gate of which is at preſent the county-goal.

The city conſiſts of three manors; the biſhop's manor containing the city liberties and the bailey, held of him by the ſervice of caſtle-guard; the manor of the dean and chapter, conſiſting of the Elvet's croſs gate, ſouth-gate ſtreet; and the manor of Gilligate, formerly belonging to the diſſolved hoſpital of Kepyar in this neighbourhood, but granted by Edward VI. to John Cockburn, lord of Ormſtoun, and late in the poſſeſſion of John Tempeſt, Eſq. The biſhopric of Durham is one of the beſt in England, not only on account of its ample revenues and prerogatives, but becauſe living is remarkably cheap in this county, and the biſhop has a great number of rich benefices in his gift.

In the neighbourhood of this city is Nevil's croſs, famous for the battle fought in the year 1346, againſt David II. king of Scotland, who was defeated and taken.

DURY (John), a Scots divine, who travelled much, and laboured with great zeal to reunite the Lutherans with the Calviniſts. His diſcouragements in this ſcheme ſtarted another ſtill more impracticable; and this was to reunite all Chriſtians by means of a new explication of the Apocalypſe, which he publiſhed at Frankfort in 1674. He enjoyed then a comfortable retreat in the country of Heſſe; but the time of his death is unknown: his letter to Peter du Moulin concerning the ſtate of the churches of England, Scotland, and Ireland, was printed at London in 1658, by the care of du Moulin, and is eſteemed to be curious.

DUSSELDORP, a city of Weſtphalia in Germany, and capital of the duchy of Berg. It is ſituated at the conflux of the river Duſſel with the Rhine, in E. Long. 6. 20. N. Lat 51. 15.

DUTCHY. See Duchy.

DUTY, in general, denotes any thing that one is obliged to perform.

Duty, in a moral ſenſe; see Moral *Philoſophy*, n° 73, &c.

Duty, in polity and commerce, ſignifies the impoſt laid on merchandizes, at importation or exportation, commonly called the duties of cuſtoms; alſo the taxes of exciſe, ſtamp-duties, &c. See Customs, Excise, &c.

The principles on which all duties and cuſtoms ſhould be laid on foreign merchandizes which are imported into theſe kingdoms, are ſuch as tend to cement a mutual friendſhip and traffick between one nation and another; and therefore due care ſhould be taken in the laying of them, that they may anſwer ſo good an end, and be reciprocal in both countries: they ſhould be ſo laid as to make the exports of this nation at leaſt equal to our imports from thoſe nations wherewith we trade, ſo that a balance in money ſhould not be iſſued out of Great Britain, to pay for the goods and merchandizes of other countries; to the end that no greater number of our landholders and manufacturers ſhould be deprived of their revenues ariſing from the product of the lands, and the labour of the people, by foreign importations, than are maintained by exportations to ſuch countries. Theſe are the national principles on which all our treaties of commerce with other countries ought to be grounded.

Duty, in the military art, is the exerciſe of thoſe functions that belong to a ſoldier: with this diſtinction, that mounting guard and the like, where there is no enemy directly to be engaged, is called duty; but their marching to meet and fight an enemy is called going on ſervice.

DUUMVIRATE, the office or dignity of the duumviri. See the next article.

The duumvirate laſted till the year of Rome 388, when it was changed into a decemvirate.

DUUMVIRI, in Roman antiquity, a general appellation given to magiſtrates, commiſſioners, and officers, where two were joined together in the ſame functions.

Duumviri *Capitales* were the judges in criminal cauſes: from their ſentence it was lawful to appeal to the people, who only had the power of condemning a citizen to death. Theſe judges were taken from the body of the decuriones; they had great power and authority, were members of the public council, and had two lictors to walk before them.

Duumviri *Municipales*, were two magiſtrates in ſome cities of the empire, anſwering to what the conſuls were at Rome: they were choſen out of the body of the decuriones; their office laſted commonly five years, upon which account they were frequently termed *quinquinales magiſtratus*. Their juriſdiction was of great extent: they had officers walking before them, carrying a ſmall ſwitch in their hands; and ſome of them aſſumed the privilege of having lictors, carrying axes and the faſces, or bundles of rods, before them.

Duumviri *Navales*, were the commiſſaries of the fleet, firſt created at the requeſt of M. Decius, tribune of the people, in the time of the war with the Samnites. The duty of their office conſiſted in giving orders for the fitting of ſhips, and giving their commiſſions to the marine officers, &c.

Duumviri *Sacrorum*, were magiſtrates created by Tarquinius Superbus, for the performance of the ſacrifices, and keeping of the ſybils books. They were choſen from among the patricians, and held their office for life: they were exempted from ſerving in the wars, and from the offices impoſed on the other citizens, and without them the oracles of the ſybils could not be conſulted.

DUYVELAND, or Diveland, one of the iſlands of Zealand, in the United Provinces, lying eaſtward of Schonen, from which it is only ſeparated by a narrow channel.

DWAL, in heraldry, the herb nightſhade, uſed by ſuch as blazon with flowers and herbs, inſtead of metals and colours, for ſable or black.

DWARF, in general, an appellation given to things greatly inferior in ſize to that which is uſual in their ſeveral kinds: thus there are dwarfs of the human ſpecies, dwarf-dogs, dwarf-trees, &c.

The Romans were paſſionately fond of dwarfs, whom they called *nani* or *nanæ*, inſomuch that they often uſed artificial methods to prevent the growth of boys deſigned for dwarfs, by incloſing them in boxes, or by the uſe of tight bandages. Auguſtus's niece, Julia, was extremely fond of a dwarf called Sonopas, who was only two feet and an hand-breadth high.—We have many other accounts of human dwarfs, but moſt of them deformed in ſome way or other beſides the ſmallneſs of their ſize. Many relations alſo concerning dwarfs we muſt neceſſarily look upon to be fabulous, as well as thoſe concerning giants.—The following hiſtory, however, which we have reaſon to look upon as authentic, is too remarkable not to be acceptable to the generality of our readers.

Jeffery Hudſon, the famous Engliſh dwarf, was born at Oakham in Rutlandſhire in 1619; and about the age of ſeven or eight, being then but 18 inches high, was retained in the ſervice of the duke of Buckingham, who reſided at Burleigh on the Hill. Soon after the marriage of Charles I. the king and queen being entertained at Burleigh, little Jeffery was ſerved up to table in a cold pye, and preſented by the ducheſs to the queen, who kept him as her dwarf. From 7 years of age till 30, he never grew taller; but after 30, he ſhot up to three feet nine inches, and there fixed. Jeffery became a conſiderable part of the entertainment of the court. Sir William Davenant wrote a poem called *Jeffreidos*, on a battle between him and a turkey-cock; and in 1638 was publiſhed a very ſmall book, called the *New Year's Gift*, preſented at court by the lady Parvula to the lord Minimus (commonly called Little Jeffery) her majeſty's ſervant, &c. written by Microphilus, with a little print of Jeffery prefixed. Before this period, Jeffery was employed on a negociation of great importance: he was ſent to France to fetch a midwife for the queen; and on his return with this gentlewoman, and her majeſty's dancing-maſter, and many rich preſents to the queen from her mother Mary de Medicis, he was taken by the Dunkirkers. Jeffery, thus made of conſequence, grew to think himſelf really ſo. He had borne with little temper the teazing of the courtiers and domeſtics, and had many ſquabbles with the king's gigantic porter. At laſt, being provoked by Mr Crofts, a young gentleman of family, a challenge enſued: and Mr Crofts coming to the rendezvous armed only with a ſquirt, the little creature was ſo enraged, that a real duel enſued; and the appointment being on horſeback with piſtols, to put them more on a level, Jeffery, with the firſt fire, ſhot his antagoniſt dead. This happened in France, whither he had attended his miſtreſs in the troubles. He was again taken priſoner by a Turkiſh rover, and ſold into Barbary. He probably did not remain long in ſlavery: for at the beginning of the civil war, he was made a captain in the royal army; and in 1644 attended the queen to France, where he remained till the Reſtoration. At laſt, upon ſuſpicion of his being privy to the Popiſh plot, he was taken up in 1682, and confined in the Gatehouſe, Weſtminſter, where he ended his life, in the 63d year of his age.

DWINA, the name of two large rivers; one of which riſes in Lithuania, and, dividing Livonia from Courland, falls into the Baltic ſea a little below Riga: the other gives name to the province of Dwina, in Ruſſia, diſcharging itſelf into the White Sea, a little below Archangel.

DYE, in architecture, any ſquare body, as the trunk or notched part of a pedeſtal: or it is the middle of the pedeſtal, or that part included between the baſe and the corniche; ſo called becauſe it is often made in the form of a cube or dye *.

* See *Architecture*, n° 66.

DYER, a perſon who profeſſes the art of dyeing all manner of colours. See DYEING.

DYER (Sir James), an eminent Engliſh lawyer, chief judge of the court of common pleas in the reign of queen Elizabeth. He died in 1581; and about 20 years after, was publiſhed his large collection of *Reports*, which have been highly eſteemed for their ſuccinctneſs and ſolidity: he alſo left other writings behind him, relative to his profeſſion.

DYER (John), the ſon of Robert Dyer, Eſq; a Welſh ſolicitor of great capacity, was born in 1700, and educated a painter; for which purpoſe he travelled to Rome, where he collected materials for his inſtructive poem called the *Ruins of Rome*: his ill health and literary turn, however, induced him to turn clergyman; and he obtained the living of Coningſby in Lincolnſhire, where he reſided until his death. He diſtinguiſhed himſelf by his poems of *Grongar Hill*, the *Ruins of Rome* above-mentioned, and the *Fleece*, publiſhed in 1757, which his bad health hardly permitted him to finiſh.

DYER's *Weed*, in botany. See RESEDA.

DYEING,

IN the utmoſt latitude of the word, may be defined, The art of tingeing cloth, ſtuff, or other matter, with a permanent colour, which penetrates the ſubſtance thereof.—It is, however, commonly reſtrained to the art of tingeing ſilk, wool, cotton, and linen, with different colours; and, as ſuch, is practiſed as a trade by thoſe who do not meddle with any of the other branches, as ſtaining of leather, &c.

1 Antiquity of the art, &c.

The dyeing art is of great antiquity; as appears from the traces of it in the oldeſt ſacred, as well as profane, writers. The honour of the invention is attributed to the Tyrians; though what leſſens the merit of it is, that it is ſaid to have owed its riſe to chance. The juices of certain fruits, leaves, &c. accidentally cruſhed, are ſuppoſed to have furniſhed the firſt hint: Pliny aſſure us, that even in his time the Gauls made uſe of no other dyes: it is added, that coloured earths, and minerals, waſhed and ſoaked with rain, gave the next dyeing materials.—But purple, an animal juice, found in a ſhell-fiſh called *murex**, *conchylium*, and *purpura*, ſeems from hiſtory to have been prior to any of them. This indeed was reſerved for the uſe of kings and princes; private perſons were forbidden by law to wear the leaſt ſcrap of it. The diſcovery of its tingeing quality is ſaid to have been taken from a dog, which having caught one of the purple-fiſhes among the rocks, and eaten it up, ſtained his mouth and beard with the precious liquor; which ſtruck the fancy of a Tyrian nymph ſo ſtrongly, that ſhe refuſed her lover Hercules any favours till he had brought her a mantle of the ſame colour.

Pliny ſeems to aſcribe the invention of the art of dyeing wool to the Lydians of Sardis: "*Inficere lanas Sardibus Lydi;*" where the word *incipere* muſt be underſtood. But a modern critic ſuſpects a falſe reading here; and, not without reaſon, for *Lydi*, ſubſtitutes *Lydda*, the name of a city on the coaſt of Phœnicia, where the chief mart of the purple dye was.

After the Phœnicians, the Sardinians ſeem to have arrived at the greateſt perfection in the dyeing art; inſomuch, that βαμμα Σαρδινιακον, *Sardinian dye*, paſſed into a proverb among the Greeks. Till the time of Alexander, we find no other ſort of dye in uſe among the Greeks but purple and ſcarlet.—It was under the ſucceſſors of that monarch, that theſe people applied themſelves to the other colours; and invented, or at leaſt perfected, blue, yellow, green, &c.—For the ancient purple, it has been long loſt; but the perfection to which the moderns have carried the other colours, abundantly indemnifies them of the loſs. It is ſtill, however, greatly to be doubted whether the permanency of the modern colours at all equals that of the ancient ones; though it is certain, that the former greatly exceed them in brightneſs.

SECT. I. *Theory of Dyeing.*

2 Salts the only means of fixing colours.

BEFORE we can enter into any conſideration of the true theory of dyeing, it is neceſſary to make the following obſervation concerning the practice, namely, That ſalts are almoſt the only means we are acquainted with by which any colouring ſubſtance can be made to fix itſelf upon thoſe matters which are the common ſubjects of dyeing. A ſolution of cochineal, for inſtance, will of itſelf impart no permanent colour to a piece of woollen cloth put into it. The red colour of the cochineal will indeed ſtain the cloth while it remains immerſed in the ſolution; but as ſoon as it is taken out and waſhed, this temporary ſtain will immediately vaniſh, and the cloth become as white as before. If now the cloth is dipped in the ſolution of any ſaline ſubſtance, alkalies alone excepted, and then immerſed in the ſolution of cochineal for ſome time, it will come out permanently coloured; nor will the colour be diſcharged even by waſhing with ſoap and water. If a quantity of ſalt is added to the ſolution of cochineal, and the cloth put in without being impregnated with any ſaline ſubſtance, the effect will be the ſame; the cloth will come out coloured; only in this laſt caſe, it muſt be well dried before waſhing it with ſoap, or moſt of the colour will be diſcharged.

3 They operate by coagulation.

By comparing this with what is delivered under the article COLOUR-*Making*, nº 13, 14. we ſhall be able to form a pretty rational theory of dyeing. It is there remarked, that a ſaline ſubſtance, (ſolution of tin in aqua regia), had a ſurpriſing power of coagulating the colouring matter of certain ſolutions, ſuch as cochineal, Brazil-wood, logwood, &c. If therefore a piece of cloth is previouſly impregnated with this ſolution, and put into the colouring one, it is plain that ſome part of the colouring matter will be coagulated by the ſolution remaining in the cloth, in the very ſame manner that it would have been if a ſmall quantity of the ſaline ſolution had been poured into the other. The cloth therefore will take up a part of the colouring matter, which cannot be diſcharged but by entirely diſcharging the ſolution of tin. This, however, ſeems to unite itſelf with the cloth very firmly, ſo that ſcarce a particle of colour will be diſcharged by waſhing in plain water, or even with ſoap; nor can the whole be taken out, without boiling the cloth in a ſolution of fixed alkali.

* See *Murex*.

alkali.

Though ſolution of tin produces this coagulation in the moſt remarkable manner, it is not to be doubted that the ſame power is poſſeſſed in ſome degree by moſt of the neutrals and imperfect ſalts. Alum poſſeſſes it very conſiderably, though not ſo much as ſolution of tin; and hence that ſalt is very much uſed in dyeing, as well as ſugar of lead, which alſo has a very ſtrong power of coagulation. The proceſs of dyeing, therefore, ſeems to be moſt analagous to that of the coagulation or curdling of milk. Before it has ſuffered this change, the milk is eaſily miſcible with water; but after it is once coagulated, the curd, or caſeous part, is very difficultly ſoluble in any liquid whatever. In like manner, the colouring matter in the ſolution of cochineal, before the cloth is put in, is eaſily ſoluble in water, and may be diffuſed through any quantity of fluid: but no ſooner is the cloth dipped in it, than the ſaline ſubſtance contained in the cloth coagulates that part of the colouring matter which lies in immediate contact with it; and, as all the fluid ſucceſſively comes into contact with it, the whole of the colour is by degrees coagulated and depoſited on the cloth.

4
Hypotheſes concerning the adheſion of the colour.

To account for the ſtrong adheſion of the colour to the dyed cloth, ſeveral hypotheſes have been formed. One is, That the fibres of wool, ſilk, &c. are hollow tubes; that the colouring matter enters them; and, after being there coagulated, ſhews itſelf through the fine tranſparent ſides of the tubes.—Another conſiders theſe filaments as ſolid lengthwiſe, but having all round their ſides an infinite number of ſmall pores like the extremities of the fine abſorbing and exhaling veſſels of the human body. In theſe pores, according to the hypotheſis, the colour is lodged; and as the pores are placed exceedingly cloſe to one another, the fine threads appear to our eyes of one uniform colour.—A third is, That the fibres are ſolid, or at leaſt with reſpect to us may be conſidered as ſuch. The ſaline ſubſtance, whatever it is, that is employed to make the colour ſtrike, ſinks into the ſurface, partly corrodes and unites itſelf with it into a third kind of ſubſtance no longer ſoluble in plain water, nor even eaſily by ſoap, but which ſtill preſerves its coagulating quality. According to this hypotheſis, the dye lies entirely on the outſide of the ſtuff, and continues as long as the effect of the ſalt continues upon the fibres of the matter to be dyed.

5
Mr Hellot's hypotheſis diſproved.

Concerning the truth of theſe hypotheſes, or indeed any others that can be invented, it is impoſſible to bring any deciſive proof. It ſeems, however, more probable that the proceſs of dyeing is accompliſhed by a coagulation of the colouring matter itſelf, rather than by any agglutination of it to the fibres by means of a vitriolated tartar, as Mr Hellot ſuppoſes. According to this gentleman's theory, a vitriolated tartar is generated in every proceſs for dyeing, and proceeds from the acid of the alum and alkaline baſis of the tartar uſed in the preparations, or in ſome of the dyeing ingredients themſelves. He ſuppoſes that the pores of the ſtuff are cleanſed and enlarged by the preparatory ſalts, and by the boiling water, in ſuch a manner as to receive the colouring particles, which particles are afterwards detained by the contraction of the pores occaſioned by cold; and further, that theſe pores are lined with a ſaline cruſt of tartar or vitriolated tartar.

On this theory, the tranſlator of the Chemical Dictionary has the following obſervations. "Mr Hellot has not ſhown that pure fixed alkali is incapable of producing the effects which he attributes to his tartar and vitriolated tartar; and both theſe ſalts, though they are difficult of ſolution, and require a great quantity of water for this purpoſe, will yet diſſolve at laſt; and therefore, if the colouring particles were fixed chiefly by means of theſe ſalts, they might be waſhed out by a large quantity of water; which we find to be contrary to experience.

6
Another hypotheſis.

"We ſhall find it more difficult to ſubſtitute a true theory, than to refute that of Mr Hellot. Many experiments ought to be previouſly made. Nevertheleſs it may be obſerved, That the colorific particles of moſt ſubſtances uſed in dyeing ſeem to be inſoluble in water, in ſpirit of wine, and even in alkaline lixiviums: that their diffuſion thro' theſe liquids is cauſed merely by their adheſion to certain gummous and reſinous particles: and that they may be diſengaged from thoſe gummy and reſinous matters, by applying a piece of ſtuff to which they have a greater adheſive power, which ſeems to be the caſe of the root-coloured and blue dyes; or by applying another ſubſtance to which theſe particles have a greater power of adheſion; ſuch as the earth of alum, in thoſe dyes where that ſalt is uſed, together with ſome other ſubſtance, as fixed or volatile alkali, capable of decompoſing alum; or as the ferruginous earth of the green vitriol in black dyes, to which the colorific particles of the galls adhere; which earths are capable of applying themſelves and of adhering to the ſtuffs. The ſeparation of the colouring particles from the gummy and reſinous matters is probably facilitated by the addition of acids and neutral ſalts, which may coagulate in ſome meaſure the vegetable matters, and leave the colorific particles diſengaged; ſo that they may apply themſelves to the ſtuff, or to the earths above-mentioned."

7
Exceptions to the general rule.

But, in whatever way the ſalts uſed in dyeing do act, it is certain they are capable, except in a very few inſtances, of fixing and giving a luſtre and permanency to the colour which otherwiſe could never be obtained. The exception to this general rule moſt commonly known, is that of indigo. This is a fine blue fecula produced by fermentation from the leaves of the Indian plant called *anil*. It is very difficult of ſolution; however, it may be diſſolved by alkaline ſalts, concentrated oil of vitriol, orpiment, or combinations of ſulphur with quicklime. If a quantity of indigo is diſſolved in a fixed alkali, (for volatile alkalies will not diſſolve it), the ſolution is always green, which is the natural colour produced in all vegetable blues by the alkali: but if any piece of ſtuff is put into this ſolution, though it remains green while immerſed in the liquid, the moment it comes in contact with the air, the diſſolving power of the alkali is totally deſtroyed; the indigo is precipitated upon the cloth, reſumes its native colour, and dyes the cloth blue.

The cauſe of this precipitation is very difficult to be inveſtigated. Perhaps it may be owing to an attraction of fixed air by the alkali from the atmoſphere, which renders the ſalt unable to diſſolve the indigo any longer. The adheſion of the colour ſeems merely owing to an attraction between it and the cloth; for the alkaline ſalt can contribute nothing to this, but would rather have the contrary effect. Perhaps, however, the great ſolvent power poſſeſſed by alkaline ſalts, by perfectly clearing away every kind of ſordes, may bring the indigo and cloth into nearer contact with each other, than when it is diſſolved in any other way; and conſequently the attraction will in theſe caſes be the ſtronger. This ſeems to have ſome probability; for when indigo is diſſolved in vitriolic acid, as in dyeing Saxon blue, the colour is much more eaſily diſcharged.

Another exception is in the juices of ſome vegetables, ſuch as the nuts of the anarcadium. This produces, without addition, a moſt deep and laſting black, never to be waſhed out or diſcharged by any means whatever. Several other plants are to be found in different parts of the world, which give an indelible black ſtain upon linen without addition; and the colouring matter of theſe ſeems to adhere by means of a very tenacious gluten, with which it is mixed, and which, when once thoroughly dried, can never be again diſſolved. In this reſpect, theſe black ſtaining colours ſeem analogous to the *purpura* of the ancients; which ſtained indelibly without addition, and was of an exceedingly viſcous and adheſive nature.

SECT. II. *Practice of Dyeing.*

§ 1. *Of the colouring materials, and ingredients for fixing the colours.*

8 True and falſe dyes. THE materials for dyeing different colours are ſo many and various, that an enumeration of them all is ſcarce to be expected. The ſame difference, however, takes place among the materials for dyeing which we have obſerved to take place among thoſe for COLOUR-*Making*. Some ingredients produce durable colours, which cannot be diſcharged either by expoſure to the air, or by waſhing with ſoap: others, though they may be made to ſtand the action of ſoap pretty well, cannot by any means be enabled to reſiſt the action of the air. Theſe are diſtinguiſhed by the different names of *true* and *falſe*, *permanent* and *fading*, &c.; nor is there any method yet diſcovered of giving the falſe colours an equal degree of durability with the true ones. This hath been attempted by mixing a permanent and a fading colour together; in which caſe it was thought that the former would impart ſomewhat of its durability to the latter: but this hath always been found to miſgive; the fading colour ſoon flying off, and leaving the permanent one behind. The ſame hath alſo been attempted by dyeing a piece of ſtuff partially with a fading colour, and then completing the dye with a permanent one. In this caſe, it was hoped, that the fading colour being covered over, and defended from the injuries of the air, by the permanent one, would neceſſarily become equally durable, or at leaſt remain a much longer time than if the ſtuff was dyed with it alone. But this alſo hath been found ineffectual; and the fading colour hath been diſſipated as ſoon when covered with a permanent one, as when left without any ſuch cover.—Solution of tin in aqua regia will give moſt of theſe fading colours an high degree of beauty, and ſome ſhare of durability, though even that is not able to make them equal to the others.—The moſt permanent dyes we have are cochineal and gum lac for fine reds and ſcarlets: indigo and woad for blue; and, when mixed in different proportions with cochineal, or lac, for purple and violet colours. Weld, and ſome other vegetables, for yellow; and madder for coarſe reds, purples, and blacks.—The fading colours are much more numerous. In this claſs are included Brazil-wood, logwood, peach-wood, red-wood, fuſtic, turmeric root, annotto, archil, &c. &c.

9 Salts to be uſed in dyeing. With regard to the ſalts made uſe of in dyeing, it hath been but too often cuſtomary to jumble together ſuch a quantity of different ones, that it was not only impoſſible to know in what particular ſalt the virtue reſided, but often the efficacy of the whole hath been totally deſtroyed, and the colour entirely ſpoiled by ſuch injudicious management. It is proper, therefore, where a mixture of two or more ſalts is intended to be made for dyeing, firſt to try the change of colour produced by each of the ſalts upon the colouring ſubſtance. If the colours are nearly alike, the mixture may be ſafely made as to that particular. But if the two colours produced by the different ſalts are very different from one another, to mix them together muſt be very injudicious. Thus, ſuppoſe you want to dye ſcarlet, ſolution of tin in aqua regia produces the neceſſary change of colour on the decoction of cochineal, and converts it into a high flame-colour, which ſhews it to be a proper ingredient; but, to the ſolution of tin, it would ſurely be the greateſt abſurdity to add a quantity of ſaccharum ſaturni, the effect of which is to change the colour of cochineal to a dull purple. But, tho' the ſalts taken ſeparately ſhould produce a colour nearly ſimilar, another thing muſt be regarded, namely, whether they can be mixed with ſafety to one another. It is the nature of many ſalts to deſtroy one another whenever they come into perfect contact by being diſſolved in water. Thus, ſolution of tin and ſaccharum ſaturni deſtroy one another; and ſo do ſolution of tin, and tartar, or cream of tartar. To mix theſe together muſt therefore be abſurd; and yet we find this laſt mixture ordered in almoſt every receipt for dyeing ſcarlet. It is alſo to be obſerved, that a mixture of different ſalts ought never to be made, out of a notion that the colour will keep the better on that account; for moſt commonly it will keep the worſe. A ſingle ſalt will anſwer for this purpoſe, better than a hundred. A mixture ſhould only be made where it is neceſſary to produce the colour deſired; and if a dyer proceeds in this ſimple manner, he may not only attain to great perfection in the art from his own experience without being taught by others, but even make conſiderable diſcoveries; as dyeing is at preſent far enough from being brought to perfection.—The ſalts chiefly to be uſed in dyeing are fixed alkalies; ſolutions of tin in the vitriolic and marine acids, and in aqua regia; ſugar of lead; cream of tartar; alum; oil of vitriol; and ſolution of iron in the acetous acid. By means of theſe, almoſt all kinds of colours may be dyed at an eaſy rate, and with very little trouble.

§ 2. *Of the manner of uſing the ingredients, and of producing the different colours.*

As the art of dyeing is, by the principles above laid down, reduced to a great degree of ſimplicity, almoſt all the directions for the practice will be contained in the following general rule.

10 General rule for dyeing all colours. Having cleaned the ſubſtance to be dyed as well as poſſible, and made choice of the ſalt proper for produ-

cing the colour deſired, diſſolve the ſalt in water, and ſteep the ſubſtance in that ſolution for 24 hours. Then take it out; and, without wringing, hang it up to dry, but without heat: and for this it will be proper to allow a pretty long time; for the more perfectly the ſalt penetrates the cloth, the more durable will the colour be. Having then prepared a coloured ſolution or decoction, put the cloth into it. The leſs heat that is applied during the time the cloth remains in the dye, the finer the colour will be, but the longer time will be required for completing the operation. If time cannot be ſpared, ſo that a ſtrong heat muſt be applied, it will be neceſſary to roll the cloth during the time of dyeing, or the colour will be in danger of proving unequal.—After the dyeing is completed, rinſe the cloth in cold water, but do not wring it ſeverely; and then hang it up to dry.

In this way may be dyed a great variety of colours, on wool, ſilk, cotton, and linen, without any variation in the proceſs. Solution of tin in the vitriolic acid will produce all degrees of red, from the paleſt pink or roſe-colour, to the higheſt crimſon and ſcarlet; and that on all the above-mentioned ſubſtances without exception.

11 Method of dyeing cotton and linen ſcarlet.

—A method of producing theſe fine colours upon cotton and linen, as well as wool, hath been a great deſideratum in dyeing; but by the abovementioned ſolution theſe ſubſtances may be dyed of the moſt beautiful red, crimſon, and ſcarlet colours, as any one may very readily ſatisfy himſelf by a trial.—The ſame thing may be done by ſolution of tin in aqua regia; but unleſs the nitrous acid prevails greatly in the mixture, the colours produced by this laſt will incline more to the purple than the former. With ſolution of tin in the marine acid, they incline remarkably to purple, and are likewiſe deficient in luſtre. The two firſt ſolutions therefore are capital ingredients in dyeing red.

12 And a umber of her colours.

The ſame preparations will alſo ſerve for dyeing all other colours, blue and green only excepted. Thus, a piece of cloth prepared with ſolution of tin in the vitriolic acid, if boiled in a decoction of cochineal, will come out of a ſcarlet colour; if with turmeric, weld, fuſtic, or many of the common yellow flowers, it will come out of different degrees of yellow; with Brazil-wood, peach-wood, &c. it will give a fine purpliſh crimſon; with logwood, a fine deep purple, &c.; and by combining theſe together in different ways, an infinity of different ſhades may be produced.

13 rections r the arſer colours.

For the coarſe reds produced from madder, the ſolutions of tin are not found to anſwer. The proper ſalts for theſe are alum and cream of tartar. In dyeing with madder, it is always neceſſary, more than when any other ingredient is uſed, to let the heat be gentle; becauſe the root, beſides the red colour it contains, has alſo a great quantity of browniſh matter in it, which is extracted by ſtrong boiling, and debaſes every colour with which it is mixed. Sugar of lead produces a purple with this root; which, however, will be brightened by an addition of alum and ſal ammoniac. A dark purple may alſo be produced from madder by mixing alum with a little ſolution of iron in the vegetable acids, particularly the acetous. With regard to blue colours, they are only to be dyed by means of indigo. This ſubſtance may be diſſolved, as we have already obſerved, by alkaline ſalts, concentrated acids, and orpiment. The firſt of theſe produces the common blues; the ſecond, the Saxon blue; and the third, the blue which is uſed in callico-printing.—The method of dyeing the common blue requires only the ſtuff to be dipped in a ſolution of indigo in the alkaline ſalt; and if the liquor is hot, the dyeing will be over almoſt inſtantaneouſly. For cotton and linen, another method hath been uſed. Lime is added to the pot-aſh, and the ſtrength of the alkali being by this means increaſed, the indigo is very ſoon diſſolved. Some raiſins are now to be beat in a braſs or marble mortar to a pulp, and thrown into the ſolution of the indigo as ſoon as taken off the fire. It ſoon throws up a copper-coloured ſcum to the ſurface; and the cotton being now put into the liquor, receives the colour in an inſtant. This is a very beautiful blue; but in what manner the raiſins act, is a matter which yet remains to be determined. If a piece of cloth is dipped in a ſolution of copper in the nitrous acid, and then boiled in logwood, it will come out of a purpliſh blue colour. This dye, however, has very little beauty or durability, and is therefore ſcarce worthy of notice.

Common green vitriol or copperas is thought to improve blue colours in general; but on what foundation, is not very apparent. By means of it, however, the colour of Pruſſian blue may be ſtruck upon cloth in ſuch a manner as to produce a temporary ſtain of exceeding great beauty; and could any method of fixing this colour be fallen upon, it would undoubtedly be a moſt valuable acquiſition. The method is, to digeſt ſome Pruſſian blue in fixed alkali till the colour is extracted. In this ſolution dip the cloth intended to be dyed, and dry it; then let it lie for a little time in a weak ſolution of copperas, and it will immediately become of a moſt beautiful blue colour. This colour, however, is diſcharged by waſhing with ſoap, and even with ſimple water.

14 Mr Woulfe's receipt for Saxon blues

A receipt was publiſhed by Mr Woulfe, in the Philoſophical Tranſactions, for an improved method of dyeing the Saxon blue; which is done by diſſolving indigo in concentrated oil of vitriol. The only improvement in Mr Woulfe's proceſs, conſiſted in digeſting the oil of vitriol and indigo in the heat of boiling water inſtead of a ſand-heat, becauſe the latter was often found to ſpoil the colour. After the indigo is diſſolved, the ſolution may be weakened at pleaſure with water; and any piece of ſtuff then dipped in it will imbibe the colour, in proportion to the ſtrength of the ſolution. This dye is very beautiful; but will neither keep its colour, nor ſtand waſhing with ſoap: unleſs great care is taken, it is alſo very apt to prove unequal.

15 Green colour how dyed.

Green colours are to be produced only by a mixture of blue and yellow; for there is no ingredient yet diſcovered, that will, by itſelf, give a good green dye. Sap-green will indeed communicate its own colour to cloth of any kind, and for that purpoſe is uſed in ſome places; but the colours dyed with this ingredient are by no means eligible. It is common firſt to dye the cloth blue with indigo, and then yellow with any yellow colouring ingredient; by which means a green colour is produced.

16 Mr Woulfe's receipt for Saxon green.

For the dyeing of Saxon green, however, it is neceſſary to produce a particular kind of yellow from Indigo. This is obtained by diſſolving indigo in ſpirit of nitre. Mr Woulfe recommends an ounce and an half of powdered indigo to be mixed with two ounces of ſpirit of nitre diluted with four times its quantity of water. The mixture is then to ſtand for a week; and, at the end of that ſpace, muſt be digeſted in a ſand-heat for an hour or more; after which, four ounces more of water is to be added: the ſolution, when filtered, will be of a fine yellow colour.—Strong ſpirit of nitre is apt to ſet fire to indigo; for which reaſon, as well as to hinder the mixture from frothing up, it muſt be diluted with water. Two ounces and an half of ſtrong ſpirit of nitre will ſet fire to one ounce and an half of indigo; but if the acid is highly concentrated, a leſs quantity will ſerve.

If the indigo be digeſted 24 hours after the ſpirit of nitre is poured on it, it will froth and boil over; but, after ſtanding a week or leſs, it has not that property.

One part of the ſolution of indigo in the acid of nitre, mixed with four or five parts of water, will dye ſilk or cloth of the paleſt yellow colour, or of any ſhade to the deepeſt, and that by letting them boil more or leſs in the colour. The addition of alum is uſeful, as it makes the colour more laſting. According as the ſolution boils away, more water muſt be added.

None of the colour in the operation ſeparates from the water, but what adheres to the ſilk or cloth; of conſequence, this colour goes far in dyeing.

Cochineal, Dutch litmus, archil, cudbear, and many other colouring ſubſtances, treated in this manner, will all dye ſilk and wool of a yellow colour.

The indigo which remains undiſſolved in making Saxon blue, and collected by filtration, if digeſted with ſpirit of nitre, dyes ſilk and wool of all ſhades of brown inclining to a yellow.

Cloth and ſilk may be dyed green with indigo; but they muſt firſt be boiled in the yellow dye, and then in the blue.

17 Black colours how dyed.

Black colours are dyed by preparing the cloth with any ſolution of iron, (but that in the acetous acid is beſt,) and then boiling it in a decoction of any aſtringent vegetable. Thoſe chiefly made uſe of for the purpoſes of dyeing, are galls, ſumach, logwood, and madder. Of theſe the laſt is the moſt durable; though galls will alſo produce a pretty laſting colour, if properly managed. Logwood dyes a very pretty, but fading, black colour. It appears, however, from ſome experiments made by Mr Clegg, that, by a proper preparation of the cloth with fixed alkaline ſalts, black colours dyed with logwood might be improved both as to beauty and durability.—"I took (ſays he) two veſſels, containing equal meaſures of a ſtrong aſtringent liquor, compoſed of galls and logwood: into one veſſel I put a ſmall quantity of pearl-aſhes; the other remained as a ſtandard. Pieces of linen and cotton cloth, after maceration in theſe liquors, were thrown together into a ſtrong ſolution of copperas; they were ſoon after taken out, and waſhed in cold water. When dry, the pieces prepared in aſhes were, all of them, much deeper than the others.

Percival's Eſſays, III. p. 335.

"I made uſe of different kinds of pearl and pot aſhes, as well as many kinds of aſtringents: the aſhes had the ſame effect whatever aſtringent was made uſe of, and the ſtrongeſt alkali always produced the deepeſt colour; and though aſhes, uſed with an aſtringent, always gave a deeper colour than the ſame aſtringent without aſhes, yet logwood, which without aſhes gave not ſo deep a colour as galls with them, gave a much deeper black than galls with the ſame addition.

"There was a remarkable difference in this caſe between lime and aſhes in their effect upon logwood; with lime it gave no blackneſs, but with aſhes it produced a deeper black than any other aſtringent I made uſe of.

"Being deſirous of trying the duration of colours produced by aſtringents, in which different quantities of pearl-aſhes had been diſſolved; in two pints of river water I boiled one ounce of logwood during ten minutes; I then added half an ounce of Aleppo galls, and boiled them together ten minutes longer; the liquor having ſtood to cool, was decanted off, and divided into ſix equal quantities. N° 1 remained as a ſtandard; into N° 2, I put ſix grains of fine pearl-aſhes; N° 3, twelve grains; N° 4, eighteen grains; N° 5, twenty-four grains; N° 6, thirty grains. To ſix drops of each of theſe liquors, I added two drops of a ſaturated ſolution of copperas. N° 2 and 3 ſtruck a deep black; N° 1 and 4, black, but inferior to 2 and 3; N° 5, a brown black; N° 6, brown.

"From this experiment it appears, that N° 5 and 6 were ſpoiled by an over proportion of aſhes.—All theſe colours were tried by writing with them on paper, and the writings have now been expoſed ſix months to the air. In N° 5 and 6, the blackneſs is quite deſtroyed; N° 4 is ſomething faded; N° 1, 2, 3, remain nearly as they were, N° 2 and 3 being ſtill ſuperior to the ſtandard."

The fineſt blacks are firſt dyed blue, with indigo; and afterwards black with ſolution of iron, and ſome aſtringent vegetable, according to the directions already given.

18 How to diſcharge colours when dyed.

Theſe are the beſt methods for producing permanent colours of all kinds. As it is neceſſary, however, often to give another colour to ſtuffs which have been already dyed, it is plain, that it is as neceſſary for a dyer to know how to *diſcharge* colours, as how to make the cloth imbibe them.—Concerning this, it is only neceſſary to obſerve, that alkaline ſalts are in general the beſt, and, where the colours are well dyed, the only means of diſcharging them. If a piece of cloth is dyed with logwood, and the colour ſtruck upon it with alum, that colour will be nearly diſcharged by oil of vitriol, or any other ſtrong acid; but if ſolution of tin has been employed in ſtriking the colour, acids have then no effect, and alkalies only can be employed. Neither will they diſcharge the colour totally, but the ſtuff muſt be bleached for ſome time to get out the remainder. If alkaline ſalts cannot be employed with ſafety to the ſtuff, it is then impoſſible to dye it any other colour than black; unleſs it be dyed a compound colour, of which the original one is a component part.

19 Of the increaſe of weight in dyeing.

Concerning the weight that colours give to ſilk, (in which it is moſt taken notice of, being ſold by weight, and a commodity of great price), it is obſerved, that one pound of raw ſilk loſeth four ounces by waſhing out the gums and the natural ſordes; that the ſame ſcoured ſilk may be raiſed to above thirty ounces from the remaining twelve, if it be dyed black with ſome materials. Of all the materials uſed in dyeing, eſpecially of black, nothing increaſes weight ſo much as galls, by which black ſilks are reſtored to as much weight as they loſt by waſhing out their gum: nor is it counted extraordinary, that blacks ſhould gain about four or ſix ounces in the dyeing upon each pound. Next to the galls, old fuſtic increaſes the weight about 1½ in 12; madder, about one ounce; weld, half an ounce. The blue vats in deep blues of the fifth ſtall, give no conſiderable weight; neither do logwood, cochineal, nor even copperas, where galls are not.

Dynaſty
||
E.

Dyeing *of Hats*. See Hats.

Dyeing *of Leather*. See Leather.

Dyeing, or *Staining*, of paper, wood, bone, marble, &c. See Bone, Marble, Paper, Wood, &c.

DYNASTY, among ancient hiſtorians, ſignifies a race or ſucceſſion of kings of the ſame line or family. Such were the dynaſties of Egypt. The word is formed from the Greek δυναςεια, of δυνοςευω, to be powerful, or king.

The Egyptians reckon 30 dynaſties within the ſpace of 36,525 years; but the generality of chronologers look upon them as fabulous. And it is very certain, that theſe dynaſties are not continually ſucceſſive, but collateral.

DYSCRACY, among phyſicians, denotes an ill habit or ſtate of the humours, as in the ſcurvy, jaundice, &c.

DYSENTERY, in medicine, a diarrhœa or flux, wherein the ſtools are mixed with blood, and the bowels miſerably tormented with gripes. See (the *Index* ſubjoined to) Medicine.

DYSENTERIC fever. *Ibid.*

DYSERT, a parliament-town of Scotland, in the county of Fife, ſituated on the northern ſhore of the frith of Forth, about 11 miles north of Edinburgh.

Dyſorexy
||
Eachard.

DYSOREXY, among phyſicians, denotes a want of appetite, proceeding from a weakly ſtomach.

DYSPEPSY, a difficulty of digeſtion.

DYSPNOEA, a difficulty of breathing, uſually called *aſthma*.

DYSURY, in medicine, a difficulty of making urine, attended with a ſenſation of heat and pain. See (the *Index* ſubjoined to) Medicine.

DYTISCUS, water-beetle, in zoology, a genus of inſects of the order of the coleoptera; the antennæ of which are ſlender and ſetaceous, and the hind feet are hairy and formed for ſwimming. There are 23 ſpecies, diſtinguiſhed by their antennæ, the colour of the elytra, &c.

DYVOUR, in Scots law; otherwiſe *Bare-man*: A perſon who, being involved in debt, and unable to pay the ſame,—for avoiding impriſonment and other pains, makes ceſſion of his effects in favour of his creditors; and does his *devoir* and duty to them, proclaiming himſelf bare man and indigent, and becoming debt-bound to them of all that he has. The word is uſed in the ſame ſenſe as Bankrupt: ſee that article; and Law, N° clxxxv. 11, 12. clxxii. 10, 11, 12, &c.

E.

E, THE ſecond vowel, and fifth letter, of the alphabet. The letter E is moſt evidently derived from the old character Ǝ in the ancient Hebrew and Phœnician alphabets, inverted by the Greeks to this poſition E, and not from the Hebrew He ה. From the ſame origin is alſo derived the Saxon *e*, which is the firſt letter in their alphabet that differs from the Latin one. It is formed by a narrower opening of the larynx than the letter A; but the other parts of the mouth are uſed nearly in the ſame manner as in that letter.

It has a long and ſhort ſound in moſt languages. The ſhort ſound is audible in *bed*, *fret*, *den*, and other words ending in conſonants: its long ſound is produby a final *e*, or an *e* at the end of words; as in *glebe*, *bere*, *hire*, *ſcene*, *ſphere*, *interfere*, *revere*, *ſincere*, &c. in moſt of which it ſounds like *ee*; as alſo in ſome others by coming after *i*, as in *believe*, *chief*, *grief*, *reprieve*, &c. and ſometimes this long ſound is expreſſed by *ee*, as in *bleed*, *beer*, *creed*, &c. Sometimes the final *e* is ſilent, and only ſerves to lengthen the ſound of the preceding vowel, as in *rag*, *rage*, *ſtag*, *ſtage*, *hug*, *huge*, &c. The ſound of *e* is obſcure in the following words, *oxen*, *heaven*, *bounden*, *fire*, *maſſacre*, *maugre*, &c.

The Greeks have their long and ſhort *e*, which they call *epſilon* and *eta*. The French have at leaſt ſix kinds of *e*'s: the Latins have likewiſe a long and ſhort *e*; they alſo write *e* inſtead of *a*, as *dicem* for *dicam*, &c. and this is, no doubt, the reaſon why *a* is ſo often changed into *e*, in the preter tenſe, as, *ago*, *egi*; *facio*, *feci*, &c.

As a numeral, E ſtands for 250, according to the verſe,

> E, *quoque ducentos et quinquaginta tenebit.*

In muſic it denotes the tone *e-la-mi*. In the calendar it is the fifth of the dominical letters. And in ſea-charts it diſtinguiſhes all the eaſterly points: thus, E alone denotes eaſt; and E. by S. and E. by N. Eaſt by South, and Eaſt by North.

EACHARD (John), an Engliſh divine of great learning and wit in the 17th century, bred at Cambridge, author (in 1670) of *The Grounds and Occaſions of the Contempt of the Clergy and Religion inquired into.* In 1675 he was choſen maſter of Catharine-hall upon the deceaſe of Dr John Lightfoot; and the year following was created D. D. by royal mandate. He died in 1696.

Eachard (Laurence), an eminent Engliſh hiſtorian of the 18th century, nearly related to Dr John Eachard. He was the ſon of a clergyman, who, by the death of his elder brother, became maſter of a good eſtate in Suffolk. He was educated in the univerſity of Cambridge, entered into holy orders, and was preſented to the living of Welton and Elkinton in Lincolnſhire, where he ſpent above 20 years of his life, and diſtinguiſhed himſelf by his writings, eſpecially his Hiſtory of England, which was attacked by Dr Edmund Calamy, and by Mr John Oldmixon. His "General Eccleſiaſtical Hiſtory from the Nativity of Chriſt to the firſt Eſtabliſhment of Chriſtianity by Human Laws under the emperor Conſtantine the Great," has paſſed through ſeveral editions. He was inſtalled archdeacon of Stowe and prebend of Lincoln in 1712. He died in 1730.

EAGLE, in ornithology. See FALCO.

EAGLE, in heraldry, is accounted one of the moſt noble bearings in armoury; and, according to the learned in this ſcience, ought to be given to none but ſuch as greatly excel in the virtues of generoſity and courage, or for having done ſingular ſervices to their ſovereigns; in which caſes they may be allowed a whole eagle, or an eagle naiſſant, or only the head or other parts thereof, as may be moſt agreeable to their exploits.

The eagle has been borne, by way of enſign or ſtandard, by ſeveral nations. The firſt who ſeem to have aſſumed the eagle, are the Perſians; according to the teſtimony of Xenophon. Afterwards, it was taken by the Romans; who, after a great variety of ſtandards, at length fixed on the eagle, in the ſecond year of the conſulate of C. Marius: till that time, they uſed indifferently wolves, leopards, and eagles, according to the humour of the commander.

The Roman eagles, it muſt be obſerved, were not painted on a cloth, or flag: but were figures in relievo, of ſilver or gold, borne on the tops of pikes; the wings being diſplayed, and frequently a thunder-bolt in their talons. Under the eagle on the pike, were piled bucklers, and ſometimes crowns. Thus much we learn from the medals.

EAGLE, in aſtronomy. See there, n° 203, 206.

EAGLE-*Stone*. See ÆTITES.

Black EAGLE, an order of knighthood, inſtituted by the elector of Brandenburgh, in 1701, on his being crowned king of Pruſſia.

The knights of this order wear an orange-coloured ribband ſuſpending a black eagle.

White EAGLE, a like order in Poland, inſtituted in 1325, by Uladiſlaus V. on occaſion of the marriage of his ſon Caſimir to the daughter of the great duke of Lithuania.

The knights of this order wear a chain of gold, ſuſpending a ſilver eagle crowned.

EAGLET, a diminutive of eagle, properly ſignifying a young eagle. In heraldry, when there are ſeveral eagles on the ſame eſcutcheon, they are termed *eaglets*.

EAR, in anatomy. See there, n° 405.

EAR, in muſic, denotes a kind of internal ſenſe, whereby we perceive and judge of harmony and muſical ſounds. See MUSIC.

In muſic we ſeem univerſally to acknowledge ſomething like a diſtinct ſenſe from the external one of hearing; and call it a *good ear*. And the like diſtinction we ſhould probably acknowledge in other affairs, had we got diſtinct names to denote theſe powers of perception by. Thus a greater capacity of perceiving the beauties of painting, architecture, &c. is called a *fine taſte*.

EAR is alſo uſed to ſignify a long cluſter of flowers, or ſeeds, produced by certain plants; uſually called by botaniſts, *ſpica*. The flowers and ſeeds of wheat, rye, barley, &c. grow in ears. The ſame holds of the flowers of lavender, &c. We ſay the *ſtem* of the ear, *i. e.* its tube, or ſtraw: the knot of the ear; the lobes, or cells wherein the grains are incloſed: the beard of the ear, &c.

EAR-*Ach*. See (the *Index* ſubjoined to) MEDICINE.

EAR-*Pick*, an inſtrument of ivory, ſilver, or other metal, ſomewhat in form of a probe, for cleanſing the ear.

The Chineſe have a variety of theſe inſtruments, with which they are mighty fond of tickling their ears; but this practice, Sir Hans Sloane obſerves, muſt be very prejudicial to ſo delicate an organ, by bringing too great a flow of humours on it.

EAR-*Ring*. See PENDENT.

EAR-*Wax*. See *Ear*-WAX.

EARWIG, in zoology. See FORFICULA.

EARING, in the ſea-language, is that part of the bolt-rope which at the four corners of the ſail is left open, in the ſhape of a ring. The two uppermoſt parts are put over the ends of the yard-arms, and ſo the ſail is made faſt to the yard; and into the lowermoſt earings, the ſheets and tacks are ſeized or bent at the clew.

EARL, a Britiſh title of nobility, next below a marquis, and above a viſcount.

The title is ſo ancient, that its original cannot be clearly traced out. This much, however, ſeems tolerably certain, that among the Saxons they were called *ealdormen*, *quaſi* elder men, ſignifying the ſame with *ſenior* or *ſenator* among the Romans; and alſo *ſchiremen*, becauſe they had each of them the civil government of a ſeveral diviſion or ſhire. On the irruption of the Danes they changed their names to *eorles*, which, according to Cambden, ſignified the ſame in their language. In Latin they are called *comites*, (a title firſt uſed in the empire), from being the king's attendants; *a ſocietate nomen ſumpſerunt, regis enim tales ſibi aſſociant*. After the Norman conqueſt they were for ſome time called *counts*, or *countees*, from the French; but they did not long retain that name themſelves, tho' their ſhires are from thence called *counties* to this day. It is now become a mere title: they have nothing to do with the government of the county; which is now entirely devolved on the ſheriff, the earl's deputy, or *vicecomes*. In writs, commiſſions, and other formal inſtruments, the king, when he mentions any peer of the degree of an earl, uſually ſtyles him "truſty and well-beloved *couſin*:" an appellation as ancient as the reign of Henry IV; who being either by his wife, his mother, or his ſiſters, actually related or allied to every earl in the kingdom, artfully and conſtantly acknowledged that connexion in all his letters and other public acts: from whence the uſage has deſcended to his ſucceſſors, though the reaſon has long ago failed.

An earl is created by cincture of ſword, mantle of ſtate put upon him by the king himſelf, a cap and a coronet put upon his head, and a charter in his hand. All the earls of England are denominated from ſome ſhire, town, or place, except three; two of whom, *viz.* earl Rivers, and earl Paulet, take their denomination from illuſtrious families: the third is not only honorary as all the reſt, but alſo officiary, as the earl-marſhal of England.

EARL *Marſhal of England*, is a great officer who had anciently ſeveral courts under his juriſdiction, as the court of chivalry, and the court of honour. Under him is alſo the herald's office or college of arms. He hath ſome pre-eminence in the court of Marſhalſea, where he may ſit in judgment againſt thoſe who offend within the verge of the king's court. The office is of great antiquity in England, and anciently of greater power than now: and has been for ſeveral ages hereditary in the moſt noble family of Howard.

EARNEST, ARRHÆ, money advanced to bind the parties to the performance of a verbal bargain. By the civil law, he who recedes from his bargain loſes his earneſt, and if the perſon who received the earneſt give back, he is to return the earneſt double. But with us, the perſon who gave it, is in ſtrictneſs obliged to abide by his bargain; and in caſe he decline it, is not diſcharged upon forfeiting his earneſt, but may be ſued for the whole money ſtipulated.

EARTH, among ancient philoſophers and chemiſts, one of the four elements of which the whole ſyſtem of nature was thought to be compoſed. See ELEMENT; and CHEMISTRY, n° 10.

EARTH, in aſtronomy and geography, one of the primary planets; being this terraqueous globe which we inhabit.

1
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cting
coſmo-
y.

The coſmogony, or knowledge of the original formation of the earth, the materials of which it was compoſed, and by what means they were diſpoſed in the order in which we ſee them at preſent, is a ſubject which, though perhaps above the reach of human ſagacity, has exerciſed the wit of philoſophers in all ages. To recount the opinions of all the eminent philoſophers of antiquity upon this ſubject would be very tedious: it may therefore ſuffice to obſerve, that, ever ſince the ſubject began to be canvaſſed, the opinions of thoſe who have treated it may be divided into two claſſes. 1. Thoſe who believed the earth, and whole viſible ſyſtem of nature, to be the Deity himſelf, or connected with him in the ſame manner that a human body is with its ſoul. 2. Thoſe who believed the materials of it to have been eternal, but diſtinct from the Deity, and put into the preſent order by ſome power either inherent in themſelves, or belonging to the Deity. Of the firſt opinion were Xenophanes, the founder of the *eleatic* ſect, Strato of Lampſacus, the Peripatetics, &c.

The ſecond opinion, namely, that the ſubſtance of the earth or univerſe (for it is impoſſible to ſpeak of the one without the other) was eternal, though not the form, was moſt generally held among the ancients. From that eſtabliſhed axiom, that "nothing can be produced from nothing," they concluded that *creation* was an impoſſibility; but at the ſame time they thought they had good reaſon to believe the world had not been always in its preſent form. They who held this opinion may again be divided into two claſſes: firſt, thoſe who endeavoured to account for the generation of the world, or its reduction into the preſent form, by principles merely mechanical, without having recourſe to any aſſiſtance from divine power; and ſecondly, thoſe who introduced an intelligent mind as the author and diſpoſer of all things. To the firſt of theſe claſſes belonged the coſmogony of the Babylonians, Phœnicians, and Egyptians; the particulars of which are too abſurd to deſerve notice. Of the ſame opinion alſo were moſt of the poets; the philoſophers Thales, Anaximander, Anaximenes, Anaxagoras, &c. The latter attempted to reform the philoſophy of his maſter Anaximenes by introducing an intelligent principle into the world, diſtinct from matter; thus making his intelligent principle, or God, the ſoul of the world. Diogenes of Apollonia ſuppoſed air, which he made the firſt principle of all things, to be endued with reaſon: His manner of philoſophiſing differed very little from that of Des Cartes. "All things, (ſays he,) being in motion, ſome became condenſed, and others rarefied. In thoſe places where condenſation prevailed, a whirling motion, or vortex, was formed; which by its revolution drew in the reſt, and the lighter parts flying upwards formed the ſun."

2
Syſtems of Democritus and Epicurus.

The moſt remarkable of the atheiſtic ſyſtems, however, was the atomic one, ſuppoſed to have been invented by Democritus; though Laertius attributes it to Leucippus, and ſome make it much older. According to this ſyſtem, the firſt principles of all things were an infinite multitude of atoms, or indiviſible particles of different ſizes and figures; which, moving fortuitouſly, or without deſign, from all eternity, in infinite ſpace, and encountering with one another, became variouſly entangled during their conflict. This firſt produced a confuſed chaos of all kinds of particles; which afterwards, by continual agitation, ſtriking and repelling each other, diſpoſed themſelves into a vortex, or vortices, where, after innumerable revolutions, and motions in all poſſible directions, they at laſt ſettled into their preſent order.

The hypotheſis of Democritus agrees in the main with that of Epicurus as repreſented by Lucretius; excepting that no mention is made of thoſe vortices, which yet were an eſſential part of the former. To the two properties of magnitude and figure which Democritus attributed to his atoms, Epicurus added a third, namely, weight; and without this, he did not imagine they could move at all. The ſyſtem of Democritus neceſſarily introduced abſolute fatal neceſſity; which Epicurus not chooſing to agree to, he invented a third motion of the atoms, unknown to thoſe who had gone before him. His predeceſſors allowed them to have a perpendicular and reflexive motion: but Epicurus, though he allowed theſe motions to be abſolutely neceſſary and unavoidable, aſſerted that the atoms could alſo of themſelves decline from the right line; and from this declination of the atoms, he explained the free-will of man.—The moſt material difference between the two ſyſtems, however, was, that Epicurus admitted no principle but the atoms themſelves; whereas Democritus believed them to be animated.

3
Of Pythagoras, Plato, and Ariſtotle.

Of thoſe who held two diſtinct and coeternal principles, *viz.* God and Matter, we ſhall only take notice of the opinions of Pythagoras, Plato, and Ariſtotle, as being the moſt remarkable. Pythagoras is ſaid to have aſſerted two ſubſtantial ſelf-exiſtent principles: a *monad*, or unity; and a *dyad*, or duality. The meaning of theſe terms is now ſomewhat uncertain. Some think, that by the monad, he meant the Deity; and, by the dyad, matter. Others think, that the Pythagoric monads

nads were atoms. The dyad is ſometimes thought to ſignify a demon or evil principle; but Porphyry's interpretation, which ſeems the moſt probable, is as follows. The cauſe, ſays he, of that ſympathy, harmony, and agreement which is in things, and of the conſervation of the whole, which is always the ſame and like itſelf, was by Pythagoras called *unity;* that unity which is in the things themſelves, being but a participation of the firſt cauſe: but the reaſon of difference, inequality, and conſtant irregularity in things, was by him called a *dyad*. This philoſopher held *numbers* to be the principles of all things, and from them he accounted for the production of the world in the following manner. He ſuppoſed that the monad and dyad were the two ſources of numbers, from whence proceeded points; from points, lines; from lines, plane figures; from planes, ſolids; from ſolids, ſenſible bodies. The elements of ſenſible bodies are four; but beſides theſe, there was a fifth (never yet diſcovered.) The four elements which manifeſt themſelves to our ſenſes are fire, air, earth, and water. Theſe are in a perpetual change, and from them the world was formed; which is animated, intelligent, and ſpherical; containing, in the midſt of it, the earth, a globoſe and inhabited body. The world, he ſaid, began from fire, and the fifth element; and that as there were five figures of ſolid bodies, called mathematical or regular, the earth was made of the cube, fire of the pyramid or tetrahedron, the air of the octahedron, water of the icoſahedron, and the ſphere of the univerſe of the dodecahedron.—This method of philoſophizing, which has no manner of foundation in nature, was adopted by Plato and Ariſtotle; and hence proceeded all the abſurdities concerning ideas, forms, qualities, &c. with which the Ariſtotelian philoſophy was loaded.

For a long time, however, the philoſophy of Ariſtotle prevailed, and the world was thought to be upheld by forms, qualities, and other unintelligible and imaginary beings.—At laſt the French philoſopher, Deſcartes, ſuperſeded the Ariſtotelian, by introducing the atomic, or Democritic, and Epicurean philoſophy†. The Carteſian ſyſtem was quickly ſuperſeded by the Newtonian; which ſtill continues, though conſiderably different from what it was left by that great man.—His opinions, indeed, concerning the coſmogony ſeem to have been in a fluctuating ſtate; and hence he delivers himſelf in ſuch a manner, that he hath often incurred the charge of contradicting himſelf.—He maintained, for inſtance, that matter was infinitely diviſible, and the mathematical demonſtrations of this propoſition are well known. Notwithſtanding this, however, when he comes particularly to ſpeak of the original conſtruction of the world, he ſeems to retract this opinion, and adopt the atomic philoſophy. He tells us, that it ſeems probable, that in the beginning God formed matter in *ſolid*, *maſſy*, *impenetrable*, particles, &c.*; and that of theſe particles, endowed with various powers of attraction and repulſion, the preſent ſyſtem of nature is formed. His primary laws of nature are only three in number, and very ſimple. The firſt is, that all matter has a tendency to continue in that ſtate in which it is once placed, whether of reſt or motion. If it is at reſt, for example, it will continue at reſt for ever, without beginning motion of itſelf; but if it is once ſet in motion, by any cauſe whatever, it will for ever continue to move in a right line, until ſomething either ſtops it altogether, or forces it to move in another direction. 2. That the change of motion is always equivalent to the moving force employed to produce it, and in the direction of the right line in which it is impreſſed; that is, if a certain force produces a certain motion, double that force will produce double that motion, &c. 3. Reaction is always contrary and equal to action; or the actions of two bodies upon one another are always equal and contrary to one another.

† See *Aſtronomy*, nº 77.

4 Newtonian ſyſtem ſuperſedes the Ariſtotelian and Carteſian.

* See *Coheſion*, nº 2.

5 Three laws of nature laid down by Sir Iſaac.

From theſe three laws, together with the two contrary forces of attraction and repulſion, Sir Iſaac Newton and his followers have attempted to explain all the phenomena of nature. When they come to explain the nature of the attractive and repulſive forces, however, they are exceedingly embarraſſed. Sir Iſaac hath expreſſed himſelf in two different ways concerning them. In his Principia, he pretty poſitively determines them to be owing to a cauſe that is not material; and in his Queries, he ſuppoſes they may be effects of ſome ſubtile matter which he calls *ether*. This diſagreement with himſelf hath produced no ſmall diſagreement among his followers. One party, laying hold of his aſſertions in the Principia, determine the world to be upheld by *immaterial* powers; while the other, neglecting the Principia, and taking notice only of the Queries at the end of the Optics, ſtrenuouſly maintain, that attraction and repulſion are owing to the action of ſome exceedingly fine and ſubtile ether.—The firſt of theſe ſuppoſitions, it is argued, neceſſarily involves us in one of the following dilemmas. 1. If the attractive and repulſive forces are not material, they muſt either be occaſioned by ſpiritual beings, or they muſt be *qualities* of matter. If they are occaſioned by the action of immaterial beings, theſe beings muſt either be created or uncreated. If they are produced by the action of created beings, we run into the ſuppoſition of ſome of the ancient heathens, that the world is governed by demons or ſubordinate intelligences; and thus may make an eaſy tranſition to polytheiſm. If attraction and repulſion are the immediate action of the Deity himſelf, we run into the doctrine of making God the ſoul of the world.—This laſt hypotheſis hath been moſt ſtrenuouſly adopted by Mr Baxter in his treatiſe of the Immateriality of the human Soul. Mr Boſcovich, Mr Mitchel, and Dr Prieſtley, have likewiſe adopted the hypotheſis of immaterial powers to ſuch a degree, that, according to them, the whole world conſiſts of nothing elſe but *attractions* and *repulſions* mixed with *phyſical points**. 2. If we ſuppoſe the attractive and repulſive powers to be only *properties*, *qualities*, or *laws*, impreſſed on matter by the Deity, we might as well have been contented with the occult qualities of Ariſtotle.—If attraction and repulſion are occaſioned by the action of mere matter, and all the powers in nature are only material, the charge is incurred of making nature direct itſelf in ſuch a manner, that there is no occaſion for the interpoſition, or even the exiſtence, of a Deity at all.

6 Diſagreement among his followers.

7 Mr Mitchel, Boſcovich, and Dr Prieſtley's opinions.

* See *Coheſion*, nº 2.

Thus we ſee, the Newtonian coſmogony muſt incline either to the Platonic and Ariſtotelian, or to the Atomic or Epicurean; according to the hypotheſis we lay down concerning the nature of attraction. Des Cartes's ſyſtem was plainly a revival of that of Democritus

8
Mr Hutchinſon's ſyſtem.

tus and Epicurus, with ſome corrections and improvements. It was farther improved and corrected by Mr Hutchinſon, who added to it the authority of Revelation. The created agents he choſe in his coſmogony were fire, light, and air. Theſe, we ſee, have indeed a very conſiderable ſhare in the operations of nature; but unleſs we explain the manner in which they operate, our knowledge is not at all increaſed, and we might as well have been contented with the Newtonian attraction and repulſion, or even the occult qualities of Ariſtotle. Attempts have indeed been made to ſolve the phenomena of nature, from the action of theſe three agents, both by Hutchinſon himſelf, and many of his followers.—Theſe attempts, however, have always proved unſucceſsful. Some phenomena indeed may be explained pretty plauſibly from the known action of theſe three; but when we come to ſpeak of what may be called the *nicer operations* of nature, ſuch as the growth of plants and animals, we are utterly at a loſs. A ſhort account of the Hutchinſonian coſmogony is given under the article DELUGE, par. 6.

9
A deficien-y of active principles in all the theories yet invented.

The manifeſt deficiency of active principles in all the theories of the earth that have yet been invented, hath occaſioned a conſtant ſearch after others which ſhould be able, by their ſuperior activity, to fill up the blank which neceſſarily remained in the ſyſtem.—Pythagoras, Plato, and Ariſtotle, being unable to account for the formation of the earth from their four elements, called in the aſſiſtance of a *fifth*, which was never yet diſcovered. Epicurus, finding the motions attributed to his atoms by Democritus to be inſufficient, had recourſe to an imaginary, and on his own principles *impoſſible*, declination of the atoms. Deſcartes finding the atoms themſelves inſufficient, aſſerted that they were not atoms, but might be broken into ſmaller parts, and thus conſtitute matter of various degrees of ſubtilty*. The Newtonian philoſophers have found Des Cartes's ſyſtem inſufficient; but being greatly diſtreſſed in their attempts to ſolve all the phenomena of nature by mere attraction and repulſion, have been obliged to call in the action of *mind* to their aſſiſtance. The Hutchinſonians were hardly put to it in accounting for every thing by the action of fire, light, and air, when luckily the diſcoveries in electricity came to their aſſiſtance. It muſt be owned, that this fluid does indeed come in like a kind of fifth element, which in many caſes appears to be the animating principle of nature. For ſome time paſt, almoſt all the remarkable phenomena in nature have been explained by electricity, or the action of the electric fluid. But unleſs this action is explained, we are got no farther than we were before. To ſay any thing is done by electricity, is not more intelligible than to ſay it was done by attraction. If we explain an effect by a material cauſe, it ought to be done upon mechanical principles. We ought to be ſenſible how one part of matter acts upon another part in ſuch a manner as to produce the effect we deſire to explain. The electrical philoſophers, however, have not yet been able to inveſtigate the manner in which this ſubtile fluid operates; and hence the many diſcoveries in electricity have not contributed to throw that light on the theory of the earth, which perhaps they may do hereafter. With ſome philoſophers, however, the electric fluid itſelf, and indeed all the powers of nature, ſeem in danger of being ſuperſeded by a principle, at preſent very little known, called the *phlogiſton*.—Thus, Mr Henly tells us*, that Mr Clarke, an ingenious gentleman in Ireland, hath diſcovered all the different kinds of air produced from metals, &c. by Dr Prieſtley, to be only *phlogiſtic vapours* ariſing from theſe ſubſtances. Dr Prieſtley himſelf ſuppoſes, that the electric light is a modification of *phlogiſton*; and conſequently thinks it probable, that all light is a modification of the ſame. Fire or flame is thought to be a chemical combination of air with the phlogiſton; and phlogiſton is thought to give the elaſticity to air, and every other elaſtic fluid, &c.—Be this as it will, however, the late diſcoveries in electricity have tended very much to change the form of the Newtonian philoſophy, and to introduce that *materialiſm* into our theories of the natural phenomena which is by ſome people ſo much complained of.

10
Little progreſs as yet made in true philoſophy.

From this general hiſtory of the different agents which philoſophers have choſen to account for the original formation of the earth, and for its preſervation in the preſent form, it appears, that ſcarce any advance in true knowledge hath yet been made. All the agents have been prodigiouſly defective; electricity itſelf, as far as yet known, not excepted. But, before entering into a particular conſideration of thoſe theories which ſeem moſt worthy of notice, it will be neceſſary to point out the principal difficulties which ſtand in the way of one who attempts to give a complete theory of the earth.

11
Difficulties which occur in forming a theory of the earth.

1. The earth, although pretty much of a ſpherical figure, is not completely ſo; but protuberates conſiderably about the equatorial parts, and is proportionably flattened at the poles, as is undeniably proved by the obſervations of modern mathematicians*. The queſtion here is, Why the natural cauſe which gave the earth ſo much of a ſpherical figure, did not make it a complete and exact ſphere?

2. The terraqueous globe conſiſts of a vaſt quantity of water as well as dry land. In many places, ſuch as the Iſthmus of Darien, a narrow neck of land is interpoſed betwixt two vaſt oceans. Theſe beat upon it on either ſide with vaſt force; yet the Iſthmus is never broke down nor diminiſhed. The caſe is the ſame with the iſthmus of Suez which joins Aſia and Africa, and with that which joins the Morea or ancient Peloponneſus to the continent. The difficulty is, By what natural power or law are theſe narrow necks of land preſerved amidſt the waters which threaten them on both ſides with deſtruction?

3. The ſurface of the earth is by no means ſmooth and equal; but in ſome places raiſed into enormous ridges of mountains, and in others ſunk down in ſuch a manner as to form deep valleys. Theſe mountains, though they have been expoſed to all the injuries of the weather for many thouſand years, exhibit no ſigns of decay. They ſtill continue of the ſame ſize as before, though vaſt quantities of earth are frequently waſhed down from them by the rains, which, together with the force of gravity, tending to level and bring them on an equality with the plains on which they ſtand, we might reaſonably think, ought by this time to have rendered them ſmaller than before. It muſt therefore be inquired into, By what natural cauſe the mountains were originally formed, and how they come to preſerve their ſize without any remarkable diminution?

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* See Aſtronomy, n° 77.

* Phil. Tranſ. vol. 67.

* See Geography.

4. The internal parts of the earth are ſtill more wonderful than the external. The utmoſt induſtry of man, indeed, can penetrate but a little way into it. As far as we can reach, however, it is found to be compoſed of diſſimilar ſtrata lying one upon another, not commonly in a horizontal direction, but inclined to the horizon at different angles. Theſe ſtrata ſeem not to be diſpoſed either according to the laws of gravity or according to their denſity, but as it were by chance. Beſides, in the internal parts of the earth are vaſt chaſms and vacuities. By what means were theſe ſtrata originally depoſited, the fiſſures and chaſms made, &c.?

5. In many places of the earth, both on the ſurface, and at great depths under it, vaſt quantities of marine productions, ſuch as ſhells, &c. are to be met with. Sometimes theſe ſhells are found in the midſt of ſolid rocks of marble and limeſtone. In the very heart of the hardeſt ſtones alſo, ſmall vegetable ſubſtances, as leaves, &c. are ſometimes to be found. The queſtion is, By what means were they brought thither?

Theſe are ſome of the moſt ſtriking difficulties which preſent themſelves to one who undertakes to write a natural hiſtory or theory of the earth. The moſt remarkable attempts to produce a theory of this kind are thoſe of Burnet, Woodward, Whiſton, and Buffon.

12 Dr Burnet's theory.

According to Dr Burnet, the earth was originally a fluid maſs, or chaos, compoſed of various ſubſtances differing both in denſity and figure. Thoſe which were moſt heavy ſunk to the centre, and formed there a hard ſolid body: thoſe which were ſpecifically lighter remained next above; and the waters, which were lighteſt of all, covered the earth all round. The air, and other ethereal fluids, which are ſtill lighter than water, floated above it, and ſurrounded the globe alſo. Between the waters, however, and the circumambient air, was formed a coat of oily and unctuous matters lighter than water. The air at firſt was very impure, and muſt neceſſarily have carried up with it many of thoſe earthy particles with which it was once blended: however, it ſoon began to purify itſelf, and depoſit thoſe particles upon the oily cruſt abovementioned; which, ſoon uniting together, the earth and oil became the cruſt of vegetable earth, with which the whole globe is now covered. His account of the deſtruction of the primæval world by the flood, by the falling down of the ſhell of earth into the waters of the abyſs, is given under the article Deluge. It only remains then to give his account of the manner in which he relieves the earth from this univerſal deſtruction; and this he does as follows. Theſe great maſſes of earth, ſays he, falling into the abyſs, drew down with them vaſt quantities alſo of air; and by daſhing againſt each other, and breaking into ſmall parts by the repeated violence of the ſhock, they at length left between them large cavities filled with nothing but air. Theſe cavities naturally offered a bed to receive the influent waters; and in proportion as they filled, the face of the earth became once more viſible. The higher parts of its broken ſurface, now become the tops of mountains, were the firſt that appeared; the plains ſoon after came forward; and at length the whole globe was delivered from the waters, except the places in the loweſt ſituations; ſo that the ocean and ſeas are ſtill a part of the ancient abyſs, that have had no place to which they might return. Iſlands and rocks are fragments of the earth's former cruſt; continents are larger maſſes of its broken ſubſtance; and all the inequalities that are to be found on the ſurface of the preſent earth are effects of the confuſion into which both earth and water were at that time thrown.

13 Dr Woodward's.

Dr Woodward begins with aſſerting, that all terrene ſubſtances are diſpoſed in beds of various natures, lying horizontally one over the other, ſomewhat like the coats of an onion: that they are replete with ſhells, and other productions of the ſea; theſe ſhells being found in the deepeſt cavities, and on the tops of the higheſt mountains. From theſe obſervations, which are warranted by experience, he proceeds to obſerve, that theſe ſhells, and extraneous foſſils, are not productions of the earth, but are all actual remains of thoſe animals which they are known to reſemble; that all the ſtrata or beds of the earth lie under each other in the order of their ſpecific gravity, and that they are diſpoſed as if they had been left there by ſubſiding waters. All this he very confidently affirms, tho' daily experience contradicts him in ſome of them; particularly, we often find layers of ſtone over the lighteſt ſoils, and the ſofteſt earth under the hardeſt bodies. However, having taken it for granted, that all the layers of the earth are found in the order of their ſpecific gravity, the lighteſt at top, and the heavieſt next the centre, he conſequently aſſerts, that all the ſubſtances of which the earth is compoſed, were originally in a ſtate of diſſolution. This diſſolution he ſuppoſes to have taken place at the flood: but being aware of an objection, that the ſhells, &c. ſuppoſed to have been depoſited at the flood are not diſſolved, he exempts them from the ſolvent power of the waters, and endeavours to ſhew that they have a ſtronger coheſion than minerals; and that, while even the hardeſt rocks are diſſolved, bones and ſhells may remain entire.

14 Mr Whiſton's.

Mr Whiſton ſuppoſes the earth to have been originally a comet; and conſiders the Moſaic account of the creation as commencing at the time when the Creator placed this comet in a more regular manner, and made it a planet in the ſolar ſyſtem. Before that time, he ſuppoſes it to have been a globe without beauty or proportion; a world in diſorder, ſubject to all the viciſſitudes which comets endure; which, according to the preſent ſyſtem of philoſophy, muſt be alternately expoſed to the extremes of heat and cold. Theſe alternations of heat and cold, continually melting and freezing the ſurface of the earth, he ſuppoſes to have produced, to a certain depth, a chaos reſembling that deſcribed by the poets, ſurrounding the ſolid contents of the earth, which ſtill continued unchanged in the midſt; making a great burning globe of more than 2000 leagues in diameter. This ſurrounding chaos, however, was far from being ſolid: he reſembles it to a denſe, though fluid atmoſphere, compoſed of ſubſtances mingled, agitated, and ſhocked againſt each other; and in this diſorder he ſuppoſes the earth to have been juſt at the eve of the Moſaic creation. But upon its orbit being then changed, when it was more regularly wheeled round the ſun, every thing took its proper place, every part of the ſurrounding fluid then fell into a certain ſituation according as it was light or heavy. The middle, or central part, which always remained unchanged, ſtill continued ſo; retaining a part of that heat which it received in its primæval approaches to-

towards the ſun; which heat he calculates may continue about 6000 years. Next to this fell the heavier parts of the chaotic atmoſphere, which ſerve to ſuſtain the lighter: but as in deſcending they could not entirely be ſeparated from many watery parts, with which they were intimately mixed, they drew down theſe alſo along with them; and theſe could not mount again after the ſurface of the earth was conſolidated: they therefore ſurrounded the heavy firſt-deſcending parts in the ſame manner as theſe ſurrounded the central globe. Thus the entire body of the earth is compoſed next the centre of a great burning globe: next this is placed an heavy terrene ſubſtance that encompaſſes it; round which is circumfuſed a body of water. Upon this body of waters is placed the cruſt of earth on which we inhabit: ſo that, according to Mr Whiſton, the globe is compoſed of a number of coats, or ſhells, one within the other, all of different denſities. The body of the earth being thus formed, the air, which is the lighteſt ſubſtance of all, ſurrounded its ſurface; and the beams of the ſun darting through, produced the light, which, we are told by Moſes, firſt obeyed the Divine command.

The whole œconomy of the creation being thus adjuſted, it only remained to account for the riſings and depreſſions on the ſurface of the earth, with the other ſeeming irregularities of its preſent appearance. The hills and valleys are by him conſidered as formed by their preſſing upon the internal fluid which ſuſtains the external ſhell of earth, with greater or leſs weight: thoſe parts of the earth which are heavieſt ſink the loweſt into the ſubjacent fluid, and thus become valleys: thoſe that are lighteſt riſe higher upon the earth's ſurface, and are called *mountains*.

Such was the face of nature before the deluge: the earth was then more fertile and populous than it is at preſent; the life of men and animals was extended to ten times its preſent duration; and all theſe advantages aroſe from the ſuperior heat of the central globe, which has ever ſince been cooling. As its heat was then in its full power, the genial principle was alſo much greater than at preſent; vegetation and animal increaſe were carried on with more vigour; and all nature ſeemed teeming with the ſeeds of life. But as theſe advantages were productive only of moral evil, it was found neceſſary to deſtroy all living creatures by a flood; and in what manner this puniſhment was accompliſhed, according to Mr Whiſton, is particularly taken notice of under the article DELUGE.

15
r Buf-
n's the-
y.

Mr Buffon's theory differs very widely from all the reſt. He begins with attempting to prove, that this world which we inhabit is no more than the ruins of a world. "The ſurface of this immenſe globe, ſays he, exhibits to our obſervation, heights, depths, plains, ſeas, marſhes, rivers, caverns, gulfs, volcanoes; and, on a curſory view, we can diſcover in the diſpoſition of theſe objects neither order nor regularity. If we penetrate into the bowels of the earth, we find metals, minerals, ſtones, bitumens, ſands, earths, waters, and mattter of every kind, placed as it were by mere accident, and without any apparent deſign. Upon a nearer and more attentive inſpection, we diſcover ſunk mountains, caverns filled up, ſhattered rocks, whole countries ſwallowed up, new iſlands emerged from the ocean, heavy ſubſtances placed above light ones, hard bodies incloſed within ſoft bodies: in a word, we find matter in every form, dry and humid, warm and cold, ſolid and brittle, blended in a chaos of confuſion, which can be compared to nothing but a heap of rubbiſh, or the ruins of a world."

When taking a particular ſurvey of the external ſurface of the globe, he begins with the ocean, and the motion communicated to it by the influence of the ſun and moon which produces the tides.—"In examining the bottom of the ſea, (ſays he), we perceive it to be equally irregular as the ſurface of the dry land. We diſcover hills and valleys, plains and hollows, rocks and earths of every kind; we diſcover likewiſe, that iſlands are nothing but the ſummits of vaſt mountains, whoſe foundations are buried in the ocean. We find other mountains whoſe tops are nearly on a level with the ſurface of the water; and rapid currents which run contrary to the general movement. Theſe currents ſometimes run in the ſame direction; at other times their motion is retrograde; but they never exceed their natural limits, which ſeem to be as immutable as thoſe which bound the efforts of land-rivers. On one hand we meet with tempeſtuous regions, where the winds blow with irreſiſtible fury; where the heavens and the ocean, equally convulſed, are mixed and confounded in the general ſhock; violent inteſtine motions, tumultuous ſwellings, water-ſpouts, and ſtrange agitations, produced by volcanoes, whoſe mouths, though many fathoms below the ſurface, vomit forth torrents of fire; and puſh, even to the clouds, a thick vapour, compoſed of water, ſulphur, and bitumen; and dreadful gulfs or whirlpools, which ſeem to attract veſſels for no other purpoſe than to ſwallow them up. On the other hand we diſcover vaſt regions of an oppoſite nature, always ſmooth and calm, but equally dangerous to the mariner. To conclude, directing our eyes toward the ſouthern or northern extremities of the globe, we diſcover huge maſſes of ice, which, detaching themſelves from the polar regions, advance, like floating mountains, to the temperate climates, where they diſſolve and vaniſh from our view. The bottom of the ocean and the ſhelving ſides of rocks produce plentiful crops of plants of many different ſpecies: its ſoil is compoſed of ſand, gravel, rocks, and ſhells; in ſome places it is a fine clay, in others a compact earth: and in general, the bottom of the ſea has an exact reſemblance to the dry land which we inhabit.

"Let us next take a view of the dry land. Upon an attentive obſervation of this, we will find, that the great chains of mountains lie nearer the equator than the poles; that in the old continent their direction is more from eaſt to weſt than from ſouth to north; and that, on the contrary, in the new continent they extend more from north to ſouth than from eaſt to weſt. But what is ſtill more remarkable, the figure and direction of theſe mountains, which have a moſt irregular appearance, correſpond ſo wonderfully, that the prominent angles of one mountain are conſtantly oppoſite to the concave angles of the neighbouring mountain, and of equal dimenſions, whether they be ſeparated by an extenſive plain or a ſmall valley. I have further remarked, that oppoſite hills are always nearly of the ſame height; and that mountains generally occupy the middle of continents, iſlands, and promontories, dividing them by their greateſt lengths. I have likewiſe traced the courſes of the principal rivers, and find that their direction is nearly perpendicular to the ſea-coaſts into which they empty themſelves; and that, during the greateſt part of their courſes they follow the direction of the mountains from which they derive their origin. The ſea-coaſts are generally bordered with rocks of marble, and other hard ſtones; or rather with earth and ſand accumulated by the waters of the ſea, or brought down and depoſited by rivers. In oppoſite coaſts, ſeparated only by ſmall arms of the ſea, the different ſtrata or beds of earth are of the ſame materials. I find that volcanoes never exiſt but in very high mountains; that a great number of them are entirely extinguiſhed; that ſome are connected to others by ſubterranean paſſages, and their eruptions not unfrequently happen at the ſame time. There are ſimilar communications between certain lakes and ſeas. Some rivers ſuddenly diſappear, and ſeem to precipitate themſelves into the bowels of the earth. We likewiſe find certain mediterranean or inland ſeas, that conſtantly receive from many and great rivers prodigious quantities of water, without any augmentation of their bounds; probably diſcharging by ſubterraneous paſſages all thoſe extraneous ſupplies. It is likewiſe eaſy to diſtinguiſh lands which have been long inhabited, from thoſe new countries where the earth appears in a rude ſtate, where the rivers are full of cataracts, where the land is nearly overflowed with water or burnt up with drought, and where every place capable of producing trees is totally covered with wood.

“ Proceeding in our examination, we diſcover that the upper ſtratum of the earth is univerſally the ſame ſubſtance: that this ſubſtance, from which all animals and vegetables derive their growth and nouriſhment, is nothing but a compoſition of the decayed parts of animal and vegetable bodies, reduced into ſuch ſmall particles that their former organic ſtate is not diſtinguiſhable. Penetrating a little deeper, we find the real earth, beds of ſand, limeſtone, clay, ſhells, marble, gravel, chalk, &c. Theſe beds are always parallel to each other, and of the ſame thickneſs throughout their whole extent. In neighbouring hills, beds or ſtrata of the ſame materials are uniformly found at the ſame levels, though the hills be ſeparated by large and deep valleys. Strata of every kind, even of the moſt ſolid rocks, are uniformly divided by perpendicular fiſſures. Shells, ſkeletons of fiſhes, marine plants, &c. are often found in the bowels of the earth, and on the tops of mountains, even at the greateſt diſtances from the ſea. Theſe ſhells, fiſhes, and plants, are exactly ſimilar to thoſe which exiſt in the ocean. Petrified ſhells are to be met with almoſt every where in prodigious quantities: they are not only incloſed in rocks of marble and limeſtone, as well as in earths and clays, but are actually incorporated and filled with the very ſubſtances in which they are incloſed. In fine, I am convinced, from repeated obſervation, that marbles, limeſtones, chalks, marles, clays, ſand, and almoſt all terreſtrial ſubſtances, whereever ſituated, are full of ſhells and other ſpoils of the ocean.”

From theſe poſitions, which he lays down as facts, Mr Buffon draws the following concluſions:

1. The changes which the earth has undergone within theſe laſt 2000 or 3000 years muſt be inconſiderable, when compared with the great revolutions that took place in thoſe ages immediately ſucceeding the creation. The reaſon he gives for this aſſertion is, that terreſtrial ſubſtances could not acquire ſolidity but by the continued action of gravity: hence, the earth muſt have been originally much ſofter than it is now, and therefore more apt to be changed by cauſes which cannot now affect it.

2. It ſeems an uncontrovertible fact, that the dry land which we now inhabit, and even the ſummits of the higheſt mountains, were formerly covered with the waters of the ſea; for ſhells and other marine bodies are ſtill found upon the very tops of mountains.

3. The waters of the ſea have remained for a long track of time upon the ſurface; becauſe in many places, ſuch immenſe banks of ſhells have been diſcovered, that it is impoſſible ſo great a multitude of animals could exiſt at the ſame time.

4. From this circumſtance it likewiſe appears, that, although the materials on the ſurface of the earth were then ſoft, eaſily diſunited, moved, and tranſported by the waters, yet theſe tranſportations could not be ſuddenly effected: they muſt have been gradual and ſucceſſive, as ſea-bodies are ſometimes found more than 1000 feet below the ſurface; and ſuch a thickneſs of earth, or ſtone, could not be accumulated in a ſhort time.

5. It is impoſſible theſe effects could be owing to the univerſal deluge. For, though we ſhould ſuppoſe that all the ſhells in the bottom of the ocean ſhould be depoſited upon the dry land; yet, beſides the difficulty of eſtabliſhing this ſuppoſition, it is plain, that as ſhells are found incorporated in marble, and in the rocks of the higheſt mountains, we muſt ſuppoſe theſe rocks and marbles to have been formed all at the very inſtant when the deluge took place; and that before this grand revolution, there were neither mountains, nor marbles, nor rocks, nor clays, nor matter of any kind ſimilar to what we are now acquainted with; as they all, with few exceptions, contain ſhells, and other productions of the ocean. Beſides, at the time of the univerſal deluge, the earth muſt have acquired a conſiderable degree of ſolidity, by the action of gravity for more than 16 centuries. During the ſhort time the deluge laſted, therefore, it is impoſſible that the waters ſhould have overturned and diſſolved the whole ſurface of the earth to the greateſt depths.

6. It is certain, (for what reaſon he does not mention), that the waters of the ſea have, at ſome period or other, remained for a ſucceſſion of ages upon what we now know to be dry land; and conſequently that the vaſt continents of Aſia, Europe, Africa, and America, were then the bottom of an immenſe ocean, replete with every thing which the preſent ocean produces.

7. It is likewiſe certain, that the different ſtrata of the earth are horizontal and parallel to each other. This parallel ſituation muſt therefore be owing to the operation of the waters, which have gradually accumulated the different materials, and given them the ſame poſition which the water itſelf invariably aſſumes.

8. It is certain that theſe ſtrata muſt have been gradually formed, and are not the effect of any ſudden revolution; becauſe nothing is more frequent than ſtrata compoſed of heavy materials placed above light ones; which never could have happened, if, according to ſome authors, the whole had been blended and diſſolved

ved by the deluge, and afterwards precipitated.

9. No other cauſe than the motion and ſediments of water could poſſibly produce the regular poſition of the various ſtrata of which the ſuperficial part of this earth conſiſts. The higheſt mountains are compoſed of parallel ſtrata, as well as the loweſt valleys. Of courſe, the formation of mountains cannot be attributed to the ſhocks of earthquakes, or to the eruptions of volcanoes. Such ſmall eminences as have been raiſed by volcanoes or convulſions of the earth, inſtead of being compoſed of parallel ſtrata, are mere maſſes of weighty materials, blended together in the utmoſt confuſion.

Having now, as he thinks, *proved*, that the dry and habitable part of the earth has remained for a long time under the waters of the ſea, and conſequently muſt have undergone the ſame changes that now take place at the bottom of the ſea, he proceeds to inquire what theſe changes are.

10. The ocean, ſince the creation of the world, has been conſtantly agitated by the tides, occaſioned by the action of the ſun and moon; and this agitation is greater in the equatorial than in the other parts of the globe, becauſe the action of the ſun and moon is there ſtrongeſt.

11. The earth performs a rapid motion on its axis; and conſequently its parts have a centrifugal force, which is alſo greateſt at the equator.

12. From the combined action of the two laſt mentioned cauſes, the tides, and the motion of the earth, it may be fairly concluded, that although this globe had been originally a perfect ſphere, its diurnal motion, and the ebbing and flowing of the tides, muſt neceſſarily, in a ſucceſſion of time, have elevated the equatorial parts, by gradually carrying mud, earth, ſand, ſhells, &c. from other climates, and depoſiting them at the equator.

13. On this ſuppoſition, the greateſt inequalities on the ſurface of the earth ought to be found, and in fact are found, in the neighbourhood of the equator.

14. As the alternate motion of the tides has been conſtant and regular ſince the exiſtence of the world, it is natural to think, that, at each tide, the water carries from one place to another a ſmall quantity of matter, which falls to the bottom as a ſediment, and forms thoſe horizontal and parallel ſtrata that every where appear. Here it may indeed be objected, that as the flux is equal to, and regularly ſucceeded by, the reflux, the two contrary motions will balance each other; and whatever is brought in by the flux will be carried back by the reflux. The motion of the ocean, therefore, could never be the cauſe of the formation even of parallel ſtrata; much leſs of mountains, and all the inequalities to be obſerved in this globe. To this Mr Buffon replies, that the alternate motion of the waters is by no means equal; for the ſea has a continual motion from eaſt to weſt: the agitations occaſioned by the winds likewiſe produce great inequalities in the tides. It muſt alſo be acknowledged, that, by every motion of the ſea, particles of earth and other matter muſt be carried from one place and depoſited in another; and that theſe collections of matter muſt aſſume the form of parallel and horizontal ſtrata. Laſtly, this objection is obviated by a well known fact. On all coaſts where the ebbing and flowing of the ſea is diſcernible, numberleſs materials are brought in by the flux, which are not carried back by the reflux. The ſea gradually increaſes on ſome places and recedes from others; narrowing its limits by depoſiting earth, ſand, ſhells, &c. which naturally take a horizontal poſition. Theſe materials when accumulated, and elevated to a certain degree, gradually ſhut out the water, and remain for ever in the form of dry land.

15. The poſſibility of a mountain's being formed at the bottom of the ſea by the motion and ſediments of the water, will appear from the following conſiderations. On a coaſt which the ſea waſhes with violence during the flow of tide, ſome part of the earth muſt be carried off at every ſtroke of the waves. Even where the ſea is bounded by rock, it is a known fact, that the rock itſelf is greatly waſted by the water; and conſequently that ſmall particles are carried off by the retreat of every wave. Thoſe particles of earth or ſtone are neceſſarily tranſported to ſome diſtance. Whenever the agitation of the water ceaſes, the particles are precipitated in the form of a ſediment, and lay the foundation of a firſt ſtratum, which is either horizontal or inclined, according to the ſituation of the ſurface on which they fall. This ſtratum is ſoon ſucceeded by another, produced by the ſame cauſe; and thus a conſiderable quantity of matter will be amaſſed, and depoſited in parallel beds. In proceſs of time this gradually accumulating maſs will become a mountain in the bottom of the ſea, exactly reſembling, both in external and internal ſtructure, thoſe mountains which we ſee on the dry land. If there happened to be ſhells in that part of the bottom of the ſea where we have ſuppoſed the ſediments to be depoſited, they will be covered, filled, and incorporated with the depoſited matter, and form a part of the general maſs. Theſe ſhells will be lodged in different parts of the mountain, correſponding to the times in which they were depoſited: thoſe which lay at the bottom before the firſt ſtratum was formed, will occupy the loweſt ſtation; the others will be found in places more elevated.

16. It has been imagined that the agitation of the ſea produced by the winds and tides is only ſuperficial, and does not affect the bottom, eſpecially where it lies very deep. But it ought to be remembered, that whatever be the depth, the whole maſs is put in motion by the tides at the ſame time; and that, in a fluid globe, this motion would be communicated even to the centre. The attractive power, which occaſions the flux and reflux, is penetrating. It acts equally upon every particle of the maſs; ſo that the quantity of its force at different depths may be determined by calculation. We cannot therefore heſitate in pronouncing, that the tides, the winds, and all other cauſes of motion in the ſea, muſt produce heights and inequalities in its bottom; and that theſe heights muſt uniformly be compoſed of regular ſtrata either horizontal or inclined. The heights thus produced will gradually augment; like the waves which formed them, they will mutually reſpect each other; and if the extent of the baſe be great, in a courſe of years they will form a vaſt chain of mountains.

17. Whenever eminences are formed, they interrupt the uniform motion of the waters, and produce currents. Between two neighbouring heights in the bottom of the ocean there muſt be a current which will follow their common direction, and, like a river, cut a channel, the angles of which will be alternately oppo-

ſite through the whole extent of its courſe. Theſe heights muſt continually increaſe: for, during the flow, the water will depoſite its ordinary ſediment upon their ridges; and the waters which are impelled by the current will force along, from great diſtances, quantities of matter, which will ſubſide between the hills, and, at the ſame time, ſcoop out a valley with correſponding angles at their foundation. Now, by means of theſe different motions and ſediments, the bottom of the ocean, though formerly ſmooth, muſt ſoon be furrowed and interſperſed with hills and chains of mountains, as we actually find it at preſent. The ſoft materials of which the eminences were originally compoſed, would gradually harden by their own gravity. Such of them as conſiſted of ſandy and cryſtalline particles, would produce thoſe enormous maſſes of rock and flint, in which we find cryſtals and other precious ſtones. Others, compoſed of ſtony particles mixed with ſhells, give riſe to thoſe beds of limeſtone and marble in which vaſt quantities of ſea-ſhells are ſtill found incorporated.

18. Theſe cauſes, as before obſerved, act with greater force under the equator than in other climates; for there the tides are higher, and the winds more uniform. The mountains of Africa and Peru are the higheſt in the world; often extending through whole continents, and ſtretching to great diſtances under the waters of the ocean. The mountains of Europe and Aſia, which extend from Spain to China, are not ſo high as thoſe of Africa and South America. According to the relations of voyagers, the mountains of the north are but ſmall hills, when compared with the mountains of the equatorial regions. Thoſe prodigious chains of mountains which run from eaſt to weſt in the old continent, and from north to ſouth in the new, muſt have been formed by the general motion of the tides. But the origin of the leſs conſiderable hills muſt be aſcribed to particular motions occaſioned by winds, currents, and other irregular agitations of the ſea.

16
How the earth was deſerted by the ocean, and left dry.

Having thus diſcuſſed ſome very important points reſpecting the theory of the earth, our author now proceeds to anſwer other queſtions which ſeem ſtill more difficult of ſolution.

19. But how has it happened that this earth, which we and our anceſtors have inhabited for ages, which, from time immemorial, has been an immenſe continent, dry, compact, and removed from the reach of water, ſhould, if formerly the bottom of an ocean, be now exalted to ſuch a height above the waters, and ſo completely ſeparated from them. Since the waters remained ſo long upon the earth, why have they now deſerted it? What accident, what cauſe, could introduce a change ſo great? A little reflection, ſays he, will furniſh us with at leaſt plauſible ſolutions to theſe ſeemingly ſo difficult queſtions. We daily obſerve the ſea gaining ground on certain coaſts, and loſing it on others. We know that the ocean has a general and uniform motion from eaſt to weſt: that it makes violent efforts againſt the rocks and low grounds which encircle it; that there are whole provinces which human induſtry can hardly defend againſt the fury of the waves; and that there are inſtances of iſlands which have but lately emerged from the waters, and of regular inundations. Hiſtory informs us of inundations and deluges of a more extenſive nature. Ought not all this to convince us, that the ſurface of the earth has experienced very great revolutions, and that the ſea may have actually given up poſſeſſion of the greateſt part of the ground which it formerly occupied? For example, let us ſuppoſe, that the old and new worlds were formerly but one continent; and that, by a violent earthquake, the ancient Atlantis of Plato was ſunk. The conſequence of this mighty revolution muſt neceſſarily be, that the ſea would ruſh in from all quarters, and form what is now called the *Atlantic ocean;* and vaſt continents, perhaps thoſe we now inhabit, would of courſe be left dry. This great revolution might be effected by the ſudden failure of ſome immenſe cavern in the interior parts of the globe, and an univerſal deluge would infallibly ſucceed.

20. But, however conjectures of this kind may ſtand, it is certain that ſuch a revolution hath happened: and we may even believe that it hath happened naturally; for if a judgment of the future is to be formed from the paſt, we have only to attend carefully to what paſſes before our eyes. It is a fact eſtabliſhed by the repeated obſervation of voyagers, that the ocean has a conſtant motion from eaſt to weſt. This motion, like the trade-winds, is not only perceived between the tropics, but through the whole temperate climates, and as near the poles as navigators have approached. As a neceſſary conſequence of this motion, the Pacific Ocean muſt make continual efforts againſt the coaſts of Tartary, China, and India; the Indian ocean muſt act againſt the eaſt coaſt of Africa; and the Atlantic muſt in a ſimilar manner act againſt all the eaſtern coaſts of America. Hence the ſea muſt have gained, and will always continue to gain, on the eaſt, and to loſe on the weſt. This of itſelf would be ſufficient to prove the poſſibility of the change of the ſea into land, and land into ſea. If ſuch is the natural effect of the ſea's motion from eaſt to weſt, may it not reaſonably be ſuppoſed, that Aſia, and all the eaſtern continent, is the moſt ancient country in the world; and that Europe, and part of Africa, eſpecially the weſt parts of theſe continents, as Britain, France, Spain, &c. are countries of a more recent date?

21. The cauſe of the perpendicular fiſſures with which the earth abounds, is eaſily inveſtigated. As various materials conſtituting the different ſtrata were tranſported by the waters, and depoſited in the form of ſediments, they would at firſt be in a very diluted ſtate, and would gradually harden and part with the ſuperfluous quantity of moiſture they contained. In proceſs of time, drying, they would naturally contract and ſplit at irregular diſtances. Theſe fiſſures neceſſarily aſſumed a perpendicular direction: becauſe in this direction the action of gravity of one particle upon another is equal to nothing: but it acts directly oppoſite to this deſcription, in a horizontal ſituation: the diminution in bulk could have no ſenſible effect but in a vertical line. The contraction of the parts in drying, therefore, and not the contained water forcing an iſſue, as has been alleged by ſome, is the cauſe of perpendicular fiſſures; for it may be often remarked, that the ſides of thoſe fiſſures, through their whole extent, correſpond as exactly as the two ſides of a ſplit piece of wood.

22. Perpendicular fiſſures vary greatly as to the extent of their openings. Some are about half an inch or an inch; others a foot or two feet; ſome extend ſeveral fathoms, and give riſe to thoſe vaſt precipices

which ſo frequently occur between oppoſite parts of the ſame rocks, in the Alps and other high mountains. It is plain, that the fiſſures, the openings of which are ſmall, have been occaſioned ſolely by drying. But thoſe which extend ſeveral feet are partly owing to another cauſe; namely, the ſinking of the foundation upon one ſide, while that of the other remains firm. If the baſe ſinks but a line or two, when the height is conſiderable, an opening of ſeveral feet, or even fathoms, will be the conſequence. When rocks are founded on clay or ſand, they ſometimes ſlip a little to one ſide; and the fiſſures are of courſe augmented by this motion.

23. The large openings, however, and prodigious cuts, which are to be met with in rocks and mountains, are to be aſcribed to another cauſe. They could be produced no other way than by the ſinking of immenſe ſubterraneous caverns, that were unable any longer to ſuſtain their incumbent load. But theſe cuts or intervals in mountains are not of the ſame nature with the perpendicular fiſſures: they appear to have been ports opened by the hand of nature for the communication of nations. This ſeems to be the intention of all large openings in chains of mountains, and of thoſe ſtraits by which different parts of the ocean are connected; as the ſtraits of Thermopylæ, of Gibraltar, &c. the gaps or ports in mount Caucaſus, the Cordileras, &c.

24. But the greateſt changes upon the ſurface of the earth are occaſioned by rains, rivers, and torrents from the mountains. Theſe derive their origin from vapours raiſed by the ſun from the ſurface of the ocean, and which are tranſported by the winds through every climate. The progreſs of theſe vapours, which are ſupported by the air, and tranſported at the pleaſure of the winds, is interrupted by the tops of the mountains, where they accumulate into clouds, and fall down in the form of rain, dew, or ſnow. At firſt, theſe waters deſcended into the plains without any fixed courſe; but they gradually hollowed out proper channels for themſelves. By the power of gravity they ran to the bottom of the mountains; and penetrating or diſſolving the lower grounds, they carried along with them ſand and gravel, cut deep furrows in the plains, and thus opened paſſages to the ſea, which always receives as much water by rivers as it loſes by evaporation. The windings in the channels of rivers have uniformly correſponding angles on their oppoſite banks; and as mountains and hills, which may be regarded as the banks of the valleys by which they are ſeparated, have likewiſe ſinuoſities with correſponding angles, this circumſtance ſeems to demonſtrate, that the valleys have been gradually formed by currents of the ocean, in the ſame manner as the channels of rivers have been produced. Rivers produce conſiderable changes on the ſurface of the earth; they carry off the ſoil, wear away the moſt ſolid rocks, and remove every thing that oppoſes their paſſage. The waters of the clouds alſo, which deſcend upon the mountains, by continually waſhing away ſome part of the earth, tend to level them with the plains; and would undoubtedly do ſo, if time enough were allowed for that purpoſe.

25. From what has been advanced, we may conclude, that the flux and reflux of the ocean have produced all the mountains, valleys, and other inequalities on the ſurface of the earth: that currents of the ſea have ſcooped out the valleys, elevated the hills, and beſtowed on them the correſponding directions: that the ſame waters of the ocean, by tranſporting and depoſiting earth, &c. have given riſe to the parallel ſtrata: that the waters from the heavens gradually deſtroy the effects of the ſea, by continually diminiſhing the heights of the mountain, filling up the valleys, and choaking up the mouths of rivers; and by reducing every thing to its proper level, they will in time reſtore the earth to the ſea, which by its natural operations will again create new continents interſperſed with mountains and valleys, and every way ſimilar to thoſe which we now inhabit.

17
Buffon's account of the formation of the planets.

Thus far our author preſerves ſome degree of plauſibility in his reaſoning; but in his account of the original formation of the earth, he certainly goes to the utmoſt verge of *probability*, or perhaps of *poſſibility*, in his ſuppoſitions. According to him, all the planets in our ſyſtem were originally parts of the ſun himſelf. They were detached from his body all at once by a mighty ſtroke of a comet. The poſſibility of driving off ſuch a quantity of matter from the ſun by a ſingle ſtroke, he labours hard to prove; but this is far from being the greateſt difficulty in his ſyſtem.—“To this theory, ſays he, it may be objected, that if the planets had been driven off from the ſun by a comet, in place of deſcribing circles round him, they muſt, according to the law of projectiles, have returned to the ſame place from whence they had been forced; and therefore, that the projectile force of the planets cannot be attributed to the impulſe of a comet.

“I reply, that the planets iſſued not from the ſun in the form of globes, but in the form of torrents; the motion of whoſe anterior particles behoved to be accelerated by thoſe behind, and the attraction of the anterior particles would alſo accelerate the motion of the poſterior; and that this acceleration, produced by one or both of theſe cauſes, might be ſuch as would neceſſarily change the original motion ariſing from the impulſe of the comet; and that, from this cauſe, might reſult a motion ſimilar to what takes place in the planets; eſpecially when it is conſidered, that the ſhock of the comets removes the ſun out of its former ſtation. This reaſoning may be illuſtrated by an example. Suppoſe a muſket-ball diſcharged from the top of a mountain, and that the force of the powder was ſufficient to ſend it beyond a ſemidiameter of the earth: it is certain that this ball would revolve round the earth, and return at every revolution to the place from whence it had been diſcharged. But, inſtead of a muſket-ball, if a rocket were employed, the continued action of the fire would greatly accelerate the original impulſive motion. This rocket would by no means return to the ſame point like the ball; but, *cæteris paribus*, would deſcribe an orbit, the perigee of which would be more or leſs diſtant from the earth in proportion to the greatneſs of the change produced in its direction by the accelerating force of the fire. In the ſame manner, if the original projectile force impreſſed by the comet on the torrent of ſolar matter was accelerated, it is probable, that the planets formed by this torrent acquired their circular or elliptical movements around the ſun.”

In like manner, he accounts for the formation and circulation of the ſecondary planets. The revolutions of the primaries on their axes, he accounts for from the obliquity of the original ſtroke impreſſed by the comet. The oblate ſpheroidal figure of the earth is eaſily deduced from its diurnal motion, and the fluidity of the whole at its firſt formation. The flattening at the poles he eſtimates at about one 230th part of the whole. As this computation differs conſiderably from the account given by the mathematicians who were ſent to different parts of the world on purpoſe to determine the figure of the earth, and who made the flatneſs at the poles equal to one 175th part of the whole, he ſuppoſes this difference to have ariſen from changes that have ſince taken place on the ſurface of the earth, occaſioned by the cauſes already mentioned. He then proceeds to account for the formation of all things, in the following manner.—"It is therefore evident, that the earth aſſumed its figure when in a melted ſtate: and, to purſue our theory, it is natural to think, that the earth, when it iſſued from the ſun, had no other form but that of a torrent of melted and inflamed matter: that this torrent, by the mutual attraction of its parts, took on a globular figure, which its diurnal motion changed into a ſpheroid: that when the earth cooled, the vapours, which are expanded like the tail of a comet, gradually condenſed, fell down in the form of water upon the ſurface, depoſiting at the ſame time a ſlimy ſubſtance mixed with ſulphur and ſalts; part of which was carried by the motion of the waters into the perpendicular fiſſures of the ſtrata, and produced metals; and the reſt remained on the ſurface, and gave riſe to the vegetable mould, which abounds in different places, with more or leſs of animal or vegetable particles, the organization of which is not obvious to the ſenſes.

"Thus the interior parts of the globe were originally compoſed of vitrified matter; and, I believe, they are ſo at preſent. Above this vitrified matter were placed thoſe bodies which the fire had reduced to the ſmalleſt particles, as ſands, which are only portions of glaſs; and above theſe, pumice-ſtones, and the ſcoriæ of melted matter, which produced the different clays. The whole was covered with water to the depth of 500 or 600 feet, which originated from the condenſation of the vapours when the earth began to cool. This water depoſited a ſtratum of mud, mixed with all thoſe matters which are capable of being ſublimed or exhaled by fire: and the air was formed of the moſt ſubtile vapours, which, from their levity, roſe above the water.

"Such was the condition of the earth when the tides, the winds, and the heat of the ſun, began to introduce changes on its ſurface. The diurnal motion of the earth, and that of the tides, elevated the waters in the equatorial regions, and neceſſarily tranſported thither great quantities of ſlime, clay, and ſand; and by thus elevating thoſe parts of the earth, they perhaps ſunk thoſe under the poles about two leagues, or a 230th part of the whole, as was formerly remarked: for the waters would eaſily reduce into powder pumice-ſtones, and other ſpongy parts of the vitrified matter upon the ſurface; and by this means excavate ſome places and elevate others, which, in time, would produce iſlands and continents, and all thoſe inequalities on the ſurface, which are more conſiderable towards the equator than towards the poles. The higheſt mountains lie between the tropics and the middle of the temperate zones, and the loweſt from the polar circles towards the poles. Indeed, both the land and ſea have moſt inequalities between the tropics, as is evident from the incredible number of iſlands peculiar to thoſe regions."

18 All theories inſufficient.

From the preceding extracts, the theories of Drs Burnet and Woodward, as well as Meſſrs Whiſton and Buffon, will be eaſily underſtood; but the deficiency of all of them muſt be exceedingly obvious even to the moſt ſuperficial reader. They all aſſume only the powers of attraction and repulſion as agents; without conſidering, that theſe two powers, or indeed any other two with which we are acquainted, could only have compoſed matters nearly ſimilar to each other. If the original particles of matter are homogeneous, and endowed with ſimilar powers, all the matter we ſee ought to be homogeneous alſo. But this is far from being the caſe. Some parts of it we ſee are exceedingly hard, others proportionably ſoft. The parts of ſome bodies attract each other violently; thoſe of others have hardly any attraction for each other, but are ſeparable by the ſmalleſt force. And though it ſhould be granted, that the powers of attraction and repulſion were originally different in different parts of matter, we have ſtill to explain by what means the ſimilar parts of matter found out each other in ſuch a chaos as the earth originally was. This ſeems an inſuperable difficulty in the ſyſtems of Drs Burnet and Woodward; and is equally, though leſs conſpicuouſly ſo, in thoſe of Whiſton and Buffon.

19 Powers of attraction and repulſion inſufficient.

20 Deficiency of Mr Whiſton's theory.

Mr Whiſton's ſyſtem has another and very remarkable defect. He ſuppoſes the earth to have been originally a comet, and at a certain time to have become a planet: but he forgets to tell us by what means this comet was originally formed, or what kind of bodies the comets are. Yet certainly this theory of the comet was as neceſſary to his ſyſtem, as the theory of the earth itſelf: for all the ſubſtances now exiſting on the earth muſt originally have exiſted in the comet; and if the natural powers were known which made a diſtinction between one ſubſtance and another in the comet, we would alſo know thoſe which diſtinguiſhed terreſtrial ſubſtances from one another. But though even this great deficiency ſhould be overlooked, the ſuppoſition of a chaos or original confuſion of any kind involves us in the greateſt difficulties. If the whole ſurface of the earth conſiſted of a chaos of melted matter, we cannot reaſonably think it would have appeared otherwiſe when cool than the lavas of burning mountains do juſt now; and this is a conſequence of his ſyſtem which Mr Whiſton ſeems to have entirely overlooked.

21 Of Mr Buffon's.

Mr Buffon's theory is liable to the ſame difficulties with the reſt. He places his chaos in the ſun, and therefore ought to have given a theory of the ſun before he gave one of the earth. It ought alſo to have been ſhewn for what purpoſe the ſun was created when he had nothing to ſhine upon, or what probability there is that comets exiſted when there were no planets. His account of the formation of the planets by the ſtroke of a comet, is juſt within the verge of *poſſibility*; but his account of the formation of mountains by the motion of the winds and tides, is certainly inconſiſtent with the common principles of mechanics. Though it ſhould be granted, that water can diſſolve every terreſtrial ſubſtance when vitrified by a heat 10,000 times greater than our hotteſt furnaces, as the ſun muſt neceſſarily be; and though the water ſhould let fall this matter as a ſediment in what quantities and forms we think proper to imagine, it is impoſſible any of it could be thrown two or three miles above the ſurface of the water, in order to form thoſe high mountains which are to be met with in different parts of the world. It is indeed very plain, that though by the motion of the waters their ſediment might be collected in great heaps, it could never reach higher than their ſurface. The mountain, once formed, muſt then be for ever covered with water; for the ſediment would take up preciſely the ſame bulk when a mountain that it did when in a ſtate of diſſolution, and the water could never retire from it as he ſuppoſes. If the waters retired into vaſt ſubterraneous caverns, according to another of Mr Buffon's ſuppoſitions, they muſt have remained for ever in theſe caverns, from whence they could not have returned to effect thoſe wonderful changes he aſcribes to them. But what in the ſtrongeſt manner ſhews the fallacy of Mr Buffon's hypotheſis, is the analogy he draws between mountains on dry land, and iſlands in the ſea. The iſlands, he ſays, are only the tops of great mountains in the ocean. If therefore the ocean had for a ſeries of many ages covered the preſent habitable part of the world, as our author ſuppoſes, we ſhould undoubtedly find many mountains upon the dry land, the tops of which had formerly been iſlands. But no ſuch thing is to be found. There is not on earth a mountain with a top broad and flat like the iſland of Great Britain or Ireland, or even like iſlands of much leſs conſideration.

22
A number
f natural
owers be-
des attrac-
ion and re-
ulſion pro-
ed to exiſt.

Theſe, and many other objections that will naturally occur to an attentive reader, ſhew the extreme difficulties under which the hypotheſis of Mr Buffon labours, as well as others. Theſe difficulties ariſe, in the firſt place, from their aſſuming too few natural powers. Though it is certain that the powers of attraction and repulſion exiſt in nature, it is no leſs certain that there are many others. One very remarkable power entirely different from thoſe of attraction and repulſion, may be called the power of *aſſimilation* or *tranſmutation*. By this, each animal, and each plant, changes the nutritious particles thrown into its ſtomach, or which it meets with in the earth, into a ſubſtance of its own peculiar kind. Thus, a ſtalk of wheat, by means of its roots, always aſſimilates the nutritious particles of the ground into that particular grain we call wheat, and no other. This power naturaliſts have not been able to explain on the principles of attraction and repulſion, or any others with which we are acquainted; and therefore it may juſtly be called one of the primary laws of this earth at leaſt, whether we underſtand the manner in which it operates or not.—Another power which ſeems to be diffuſed throughout this terraqueous globe, and common to all ſubſtances, water alone excepted, is that of multiplying themſelves, or producing others of the ſame ſpecies. With regard to plants and animals, this is exceedingly evident; but may be diſputed in the caſe of minerals. It is certain, however, that mines which have been exhauſted, will in time be again repleniſhed with ore; that ſpars and cryſtals, if broken or cut while their connection with the earth remains, will protrude a ſubſtance ſimilar to the reſt, as certainly as the wounded body of an animal will protrude fleſh of a kind ſimilar to what was taken away. The earth itſelf is capable of this multiplication. We ſee how it hath a tendency to aſcend, and cover ſtones, &c. which lie a long time on its ſurface; and thus does this element, ſeemingly the moſt ſluggiſh of all others, ſwallow up every thing that lies for ſome time undiſturbed upon it. Hence we now meet with many monuments of antiquity below ground, which formerly were undoubtedly above it. Yet we have no right from thence to conclude, that there was at that time any conſiderable difference between the height of the dry-land above the water and what it is now. This multiplication of earth is chiefly owing to vegetation; which continually produces a new cruſt on the top, and thus tends to bury all ſuch matters as reſt upon the ſurface. This cruſt, however, does not produce a continual increaſe in the height of the dry land; for whatever quantity the vegetables add to the ſurface, they take from the under parts by the ſuction of their roots. Thus the ground becomes more porous, and the weight of ancient buildings, ſtones, &c. gradually forcing them downwards, they are at laſt buried under ground to a conſiderable depth.—Hence it is eaſy to account for the ſinking of the marine bodies that are to be found at different depths in the earth, even ſuppoſing them to have been left on its ſurface by the deluge. Mr Buffon's objection, drawn from the great quantities of them, ſeems but very weak: for it is certain, that marine animals, both of the cruſtaceous and other kinds, are found in the ſea at this day in amazing quantities; and there is no bed of ſhells ſo large, that we can reaſonably think it *impoſſible* for all the animals to have exiſted in it at once.

23
Appearance of ſhells at great depths accounted for.

24
Changes may naturally happen in the ſtrata of the earth.

With regard to the ſtrata, it ſeems undeniable that they may be produced from natural cauſes. Clay will ſometimes be conſolidated into ſtone; flint, marble, and limeſtone, are all found to grow naturally in the earth; ſo that we cannot draw any concluſion from the order in which we now find them. Though we find a bed of ſhells, then, in the heart of a ſolid rock, this makes no difficulty in the theory of the earth; ſince we know that the rock hath by ſome natural cauſe been conſolidated around them. In fact, this is not ſo wonderful, as what is related by Mr Price in his treatiſe of minerals, mines, &c. *viz.* That at the town of Redruth in Cornwall, "ſome labourers being put to clear and level the ſtreet for a pavement, they found a piece of hard ſtone in the ground, with abundance of common ſmall pins of braſs interſperſed in and throughout the ſtone, in ſuch manner and form, that all thoſe who ſaw it afterwards, were convinced it was not done artificially, but that the ſtone was formed and produced by petrifaction, ſubſequent to the time the pins were dropped into the ground. Doctor Plot, in his Natural Hiſtory of Staffordſhire, ſays, that near Newcaſtle under Lyne, there was found a ſtone with a man's ſkull, teeth and all, incloſed in it."—From theſe and other facts in ſome meaſure ſimilar, this author concludes, that "every earth or clay, in ſome places, may be converted into ſtone in proceſs of time, at ſuch a depth where it is undiſturbed by being never lacerated nor moleſted, and alſo where it abounds with an uncommon quantity of juices of a lapideſcent quality:

but this property being extenuated or deſtroyed, the earthy ſtones may not improbably again return to their primitive clay. Thus we ſee ſome ſorts of ſtone, when dug out of the ground and expoſed to the air for a conſiderable time, do moulder again into earth, at leaſt in appearance; while others, of an earth-like quality, are indurated, and become more compact and durable by lying above ground."

25
No ſufficient proof of extraordinary changes on the ſurface of the earth.

With regard to the extraordinary changes which Mr Buffon and others imagine to have taken place on the ſurface of the earth, they do not appear to have any ſolid foundation. Changes, no doubt, have happened in particular parts; new iſlands have been thrown up from the bottom of the ſea by the force of ſubterraneous fire, and others have been ſwallowed up. But theſe appear to be merely the effects of volcanoes, which are common in many parts of the world; and we are not warranted to conclude, becauſe we ſee a ſmall volcanic iſland ariſe, and another ſwallowed up, that this has been the caſe with the whole habitable world.—An imperfect theory hath indeed been ſuggeſted by Sir William Hamilton, Mr Brydone, and others, concerning the uſe of volcanoes and ſubterraneous fires; from whence it might ſeem probable, though they do not indeed ſay ſo in direct terms, that all the dry land was originally thrown up from the bottom of the ſea by the force of theſe fires. Sir William Hamilton, in his letter to Doctor Maty, broaches this theory in the following words. "I am myſelf convinced, that the whole circuit, ſo far as I have examined, within the boundaries marked in the map, (extending at leaſt 50 Italian miles in length, and 30 in breadth where broadeſt,) is wholly and totally the production of ſubterraneous fires; and that moſt probably the ſea formerly reached the mountains that lie behind Capua and Caſerta, and are a continuation of the Appenines. If I may be allowed to compare ſmall things with great, I imagine the ſubterraneous fires to have worked in this country under the bottom of the ſea, as moles in a field, throwing up here and there a hillock; and that the matter thrown out of ſome of theſe hillocks formed into ſettled volcanoes, filling up the ſpace between the one and the other, has compoſed this part of the continent, and many of the iſlands adjoining.

26
Volcanic theory.

"From the obſervations I have made upon Mount Ætna, Veſuvius, and the neighbourhood, I dare ſay, that, after a careful examination, moſt mountains that are, or have been, volcanoes, would be found to owe their exiſtence to ſubterraneous fire; the direct reverſe of what I find the commonly received opinion.—Nature, though varied, is certainly in general uniform in her operations; and I cannot conceive, that two ſuch conſiderable volcanoes as Ætna and Veſuvius, ſhould have been formed otherwiſe than every other conſiderable volcano of the known world. I do not wonder that ſo little progreſs hath been made in the improvement of natural hiſtory, and particularly in that branch of it which regards the theory of the earth: nature acts ſlowly; it is difficult to catch her in the fact.

"From repeated obſervations I have made in the neighbourhood of Veſuvius, I am ſure that no virgin ſoil is to be found there; and that all is compoſed of different ſtrata of erupted matter, even to a great depth below the level of the ſea. In ſhort, I have not any doubt in my own mind but that this volcano took its riſe from the bottom of the ſea; and as the whole plain between Veſuvius and the mountains behind Caſerta, which is the beſt part of Campagna Felice, is (under its good ſoil) compoſed of burnt matter, I imagine the ſea to have waſhed the feet of thoſe mountains, until the ſubterraneous fires began to operate, at a period certainly of a moſt remote antiquity.

"The ſoil of the Campagna Felice is very fertile; I ſaw the earth opened in many places. The ſtratum of good ſoil was in general four or five feet thick; under which was a deep ſtratum of cinders, pumice, fragments of lava, and ſuch burnt matter as abounds near Mount Veſuvius and all volcanoes. The mountains at the back of Caſerta are moſtly of a ſort of limeſtone, and very different from thoſe formed by fire; though Signior Van Vitelli, the celebrated architect, has aſſured me, that in the cutting of the famous aqueduct of Caſerta through theſe mountains, he met with ſome ſoils that had evidently been formed by ſubterraneous fires. The high grounds which extend from Caſtel-a-Mare to the point of Minerva towards the iſland of Caprea, and from the promontory that divides the bay of Naples from that of Salerno, are of limeſtone. The plain of Sorrento, that is bounded by theſe high grounds, beginning at the village of Vico, and ending at that of Maſſa, is wholly compoſed of the ſame ſort of tuſa as that about Naples; except that the cinders or pumice-ſtones intermixed in it, are larger than in the Naples tuſa. I conceive, then, that there has been an exploſion in this ſpot from the bottom of the ſea. This plain, as I have remarked to be the caſe with all ſoils produced by ſubterraneous fire, is extremely fertile; whilſt the ground about it, being of another nature, is not ſo. The iſland of Caprea does not ſhew any ſigns of having been formed by ſubterraneous fire; but is of the ſame nature as the high grounds laſt mentioned, from whence it has been probably detached by earthquakes, or the violence of the waves. Rovigliano, an iſland, or rather a rock, in the bay of Caſtel-a-Mare, is likewiſe of limeſtone, and ſeems to have belonged to the original mountains in its neighbourhood: in ſome of theſe mountains alſo, there are petrified fiſh and foſſile ſhells, which I never have found in the mountains which I ſuppoſe to have been formed by exploſion. Bracini, however, in his account of the eruption of 1613, ſays, that he found many ſorts of ſea-ſhells on Veſuvius after that eruption; and P. Ignatio, in his account of the ſame eruption, ſays, that he and his companions picked up many ſhells likewiſe at that time upon the mountain: this circumſtance would induce one to believe, that the water thrown out of Veſuvius during that formidable eruption, came from the ſea."

27
Inſufficiency of the volcanic theory.

This may ſerve to ſhew upon what grounds the volcanic theory ſtands; but though we ſhould admit it in its utmoſt extent, the theory of the earth can receive but very little aſſiſtance from it. Mr Hamilton himſelf does not ſay that *all* the mountains have been volcanoes, or that *all* the ſoil throughout the different quarters of the world hath been thrown up from the bottom of the ſea. If, therefore, there remains but one mountain in the whole world which never was a volcano, we ſhall be as much difficulted to account for the production of that one, as though there were ever ſo many; and at any rate our theory will be abſolutely uſeleſs, becauſe what will account for the origin of that mountain, will alſo account for the origin of others. If we go a ſtep beyond Mr Hamilton, and ſay, that there are no mountains whatever that have not been originally volcanoes, but that all the dry land is the production of ſubterraneous fire, our difficulties are ſo far from being removed, that they are greatly increaſed. The lavas and volcanic aſhes, though in time they become covered with an exceedingly fertile ſoil, remain abſolutely barren for a great number of years, inſomuch that, by the adopters of the volcanic hypotheſis, the period at which Moſes fixes the creation is reckoned by far too late to have given time for covering the many lavas of Italy and Sicily with the depth of earth they juſt now have upon them. The whole world therefore muſt have remained for many ages in a ſtate of abſolute ſterility; and by what means vegetation firſt began, or in what corner of the world, remains to be inquired into.

28
Centrifugal orce not he cauſe of he earth's ſpheroidal gure.

Without entering further into the theories either of Mr Hamilton, or any other perſon, it is eaſy to ſee, that all of them are inſufficient to ſolve the difficulties mentioned n° 11. It is common to account for the ſpheroidal figure of the earth, from the greater centrifugal force of the equatorial parts than of the polar ones; but this explication can by no means be deemed ſufficient. The globe we inhabit is compoſed of two very different kinds of matter, earth and water. The former has a very conſiderable power of coheſion, beſides the gravitating power; the latter has very little coheſion, and its parts may be ſeparated from each other by whatever will overcome its weight. It follows, therefore, that the ſolid parts of the earth, reſiſting, by their coheſion, the centrifugal force more than the water, ought not to dilate ſo much. The waters of the ocean therefore ought, about the equator, to ſwell up and overflow the land; and this they ought to do at this preſent moment as much as at the firſt creation. That this ought to be the caſe, is evident from the phenomena of the tides. It is not to be doubted but that the attraction of the moon affects the ſolid earth as well as the ſea; but becauſe of the greater coheſion of the former, it cannot yield as the ocean does, and therefore the waters are raiſed to ſome height above it. The height to which the waters would have covered the equatorial parts by the centrifugal force, muſt have been equal to the depreſſion at the poles; which, according to Mr Buffon, is about 17 miles, according to other mathematicians 25 or 26 miles.

27
ſuffici- cy of the lcanic eory.

The other difficulties are ſo totally inexplicable, that Buffon, who ſeems to exert himſelf as much as poſſible in order to remove them, is obliged at laſt to own, that the earth is in a periſhing ſtate; that the hills will be levelled, and the ocean at laſt cover the whole face of the earth; a prophecy which wears no very favourable aſpect to the inhabitants of this globe. —For theſe imaginations, however, there does not ſeem to be the ſmalleſt foundation in nature. The mountains have continued what they were, from the earlieſt accounts of time, without any ſigns of decay. Mount Ætna, beſides the waſte common to it with other mountains, hath been exhauſting itſelf by throwing out incredible quantities of its own ſubſtance; yet it ſtill ſeems to be what it was called by Pindar 2200 years ago, the *pillar of heaven*. It ſeems extremely probable therefore, that there are powers in the ſyſtem of nature which tend to preſerve, and are capable of counteracting thoſe which tend to deſtroy, the mountains; and perhaps the late diſcovery concerning the attraction of mountains may ſome time or other throw ſome light on the nature of theſe powers. See MOUNTAIN.

29
tural wers for ſerving moun- ns.

30
And iſthmuſes.

The like may be ſaid of the iſthmuſes or narrow necks of land which in ſome parts of the world join different countries together; ſuch as the iſthmus of Darien, of Suez, the Morea, &c. Though the ocean ſeems to beat on theſe with great violence, they are never diminiſhed in bulk, or waſhed away, as, according to Buffon's theory, they ought to be. It is plain, therefore, that there is in nature ſome power by which theſe narrow necks of land are preſerved from the fury of the ocean; for hiſtory does not afford one inſtance of any neck of land of this kind being broken down by the ſea.—The difficulties with regard to the ſtrata and ſhells ſeem inſolveable by any other means than ſuppoſing that there are in the terreſtrial matter ſeveral diſtinct powers, by which the ſtrata of any particular kind are occaſionally transformed into others; and that the ſhells and other marine bodies were originally depoſited on the ſurface by the deluge. The volcanic hypotheſis, by which ſome attempt to account for the appearance of theſe bodies, will in no ſhape anſwer the purpoſe. By the exploſions of a volcano, ſhells, mud, ſand, &c. might be indiſcriminately thrown up, and ſcattered irregularly about; but we could never find the large beds of ſhells which are frequently to be met with of a conſiderable extent, in different parts of the earth.

31
Notion of a chaos ought not to be adopted.

With regard to any degree of certainty, it is ſcarcely to be hoped for on this ſubject. The common notion of the earth's being originally a chaos, ſeems neither to have a foundation in reaſon, nor in the Moſaic account of the creation. It is ſurely inconſiſtent with the wiſdom aſcribed to the Deity, to think that he would create this viſible ſyſtem in confuſion, and then employ it to put itſelf in order. It ſeems more probable, that the earth was originally created with the inequalities of ſurface we ſee it have, and that the natural powers for preſerving it were afterwards ſuperadded. Thus, according to Moſes, the firſt natural agent created, or produced, by directing matter to move in a certain manner, was *light*. This, we know, was abſolutely neceſſary for the evaporation of the water which took place on the ſecond day. Moſes tells us, that the earth was originally covered with water: and we ſee a natural reaſon why it ſhould be ſo; namely, that the evaporation by the atmoſphere might more eaſily take place. When this was done, there being then no more occaſion for the waters in that diffuſed ſtate, they were commanded to retire into the place appointed for them, and thus formed the ocean. Whether this was done by the action of gravity then firſt taking place, or by any other means, we have it not in our power to know, nor will our ſpeculations on this ſubject probably be attended with much benefit. We ſee, however, that the Moſaic account of the creation is perfectly conſiſtent with itſelf, and free from thoſe difficulties with which other ſyſtems are clogged. It is impoſſible to ſhew, how, by any natural power, a confuſed maſs of matter, ſuch as the chaos of the ancient poets, of Drs Burnet and Woodward, the hollow globe of Mr Hutchinſon, the comet of Mr Whiſton, or the vitrified matter of Mr Buffon, could put itſelf in the order in which we ſee it. The ſacred hiſtorian ſimply tells us, that God created the heavens and the earth; that the heavens gave no light, and the earth was covered with water. He firſt commanded the light to ſhine, then the air to take up what quantity of water he thought proper for the purpoſes of vegetation. After this, the dry land was made to appear; and the different powers of vegetation already taken notice of, were given to it. Next the ſun and moon were created as ſubordinate agents, to do what we are told the deity had done before by his own immediate action, namely, to *divide the light from the darkneſs*, &c. Then followed the formation of animals and of man.

32 Moſaic account of the creation perfectly conſiſtent.

According to this account, it would appear, that what we call the *laws of nature*, were given to preſerve the earth in that ſhape which the Deity thought proper to give it originally by his own power; and by no means to form it in any particular way, much leſs to put it out of the form which he had already given it: and thus the world, according to the beſt accounts we have, is very little altered in its appearance; and, according to what we can judge, will continue unaltered for ever, unleſs the Creator thinks proper to interpoſe in ſuch a manner as to ſuperſede all the laws he hath given it, and change it into ſome other form.

33 Objections to the Moſaic chronology.

From ſome obſervations of Mr Hamilton and others, objections have been drawn, as hath been already mentioned, to the Moſaic chronology. Theſe objections are in ſubſtance as follows. In pits, and other natural and artificial openings of the ground, in the neighbourhood of Veſuvius and Ætna, ſeveral beds of lava have been diſcovered at conſiderable depths below each other. Theſe beds of lava in ſome places are covered with ſucceſſive ſtrata of vegetable mould. From this diſpoſition of materials, Sir William concludes that the world muſt have been created at a much more remote period than is generally believed. The different ſtrata of lava found below ground, he obſerves, muſt have proceeded from an equal number of eruptions from the mountain; and, ſuch of them as are covered with vegetable ſoil muſt have remained at leaſt 1000 years on the ſurface before they could acquire a ſoil ſufficient for the purpoſes of vegetation. Ten or twelve ſucceſſive ſtrata overlaid with ſoil, have already been diſcovered in the bowels of the earth; and it has been ſtrongly aſſerted, that, by digging deeper, many more might have been found. Now, allowing 1000 years for each ſtratum of lava, which the ſupporters of this theory affirm to be too little, the antiquity of the earth cannot be leſs than 12,000 years, which is more than double its age according to the Moſaic account.

The principal fact in this theory is, that 1000 years are neceſſary to the production of a ſoil ſufficient for the nouriſhment and growth of vegetables upon volcanic lavas. This notion is confirmed by a conjecture of the Canonico Recupero, that ſtreams of lava in Sicily have lain for centuries without acquiring a vegetable mould; and by ſome obſcure accounts, that theſe lavas have proceeded from eruptions of Ætna above 1000 years ago. The following conſiderations, however, will render this theory at leaſt extremely dubious.

34 Anſwered.

Sir William informs us, that ſome lavas are very ſolid, and reſiſt the operation of time much longer than another kind, which, he ſays, "is farinaceous, the particles ſeparating as they force their way out, juſt like meal coming from under the grindſtones. A ſtream of lava of this ſort, (he juſtly obſerves) being leſs compact, and containing more earthy particles, would certainly be much ſooner fit for vegetation than one compoſed of the more perfect vitrified matter." He has not, however, ventured to determine whether theſe lavas found below ground were of the former or latter quality; a circumſtance which materially affects the juſtneſs of his calculation.

That ſoil gradually increaſes by decayed vegetables, and the ſediment depoſited by ſnow and rain, is an undeniable fact. The thickneſs or thinneſs of ſoil indicates a greater or leſs time of accumulation. But Sir William has not informed us of the dimenſions of his ſubterraneous vegetable ſtrata; a circumſtance of great moment in inſtituting a calculation of their different æras.

Beſides, eruptions of volcanoes are often accompanied with incredible quantities of aſhes, which fall thick upon all the ground for many miles round, intended by nature, it would appear, quickly to repair the barrenneſs occaſioned by the lava. The muddy water ſometimes thrown out may co-operate powerfully with the aſhes in producing the ſame happy effect.

But Sir William has furniſhed us with facts of a more important nature. The town of Herculaneum was deſtroyed by an eruption in the 97th year of the Chriſtian æra. There are evident marks, ſays he, that the matter of ſix eruptions has taken its courſe over Herculaneum; for each of the ſix ſtrata of lava is covered with a vein of good ſoil. Here we have Sir William's own authority for ſix ſtrata of *good ſoil*, accumulated in leſs than 1700 years; which, ſuppoſing them to be all of equal thickneſs, inſtead of 1000 years, leaves not 300 to the production of each.

From the ſame authority we learn, that the crater on the top of the Monte Nuovo, or New Mountain, which was thrown up by ſubterraneous fire no farther back than the year 1538, is now covered with ſhrubs.

There is not on record any eruption from the great crater of Veſuvius from the year 1139 to 1631, a period of only 492 years. But, Bracini, who deſcended into it not long before the 1631, tells us, "that the crater was five miles in circumference, and about 1000 paces deep. Its ſides were covered with bruſhwood, and at the bottom there was a plain on which cattle grazed. In the woody parts, boars frequently harboured," &c.

The correſpondence of theſe facts, related by Sir William himſelf, with his favourite notion that 1000 years are neceſſary for the production of a vegetable ſoil, we leave the reader to determine; and ſhall conclude with a few remarks of a different kind.

The appearance of a ſtratum of lava below ground, though not covered with vegetable ſoil, our author conſiders as demonſtrative evidence, that ſuch ſtratum formerly lay above the ſurface, and was thrown out by an eruption. This inference, however, ſeems not altogether juſt. Nothing, with propriety, receives the denomination of an eruption, unleſs when lava or other matter is vomited from the crater, or from ſome new opening made in the mountain. But it deſerves notice, that, in the environs of volcanoes, earthquakes are frequent.

quent. That theſe violent concuſſions are the genuine produce of ſubterraneous fire expanding itſelf in every direction, and making ſtrong efforts againſt every ſubſtance which reſiſts the natural tendency of its courſe, is a fact that cannot admit of doubt. It is no leſs certain, that theſe frequent concuſſions ſhake and diſlocate the internal parts of the earth. They cannot fail to ſhatter and diſarrange the natural direction of the original ſtrata; and, of courſe, they muſt give riſe to many ſubterraneous cavities and fiſſures. The nearer the great furnace, which confines the fury of the flames, the greater and more frequent will be the cavities. Every earthquake occaſioned by a volcano is nothing elſe than an effort of the burning matter to enlarge the boundaries by which it is uſually limited. If the quantity of matter and degree of inflammation require a ſpace greatly ſuperior to the internal cavities, an eruption above the ſurface is an infallible conſequence. But, when the quantity of matter, or the expanſive force occaſioned by the degree of inflammation, is inſufficient to raiſe the lava to the top of the mountain, an earthquake may be produced; and the lava, without ever appearing above the ſurface, may run below ground in plentiful ſtreams, and fill up all the ſubterraneous cavities and channels. Theſe internal ſtrata of lava may often lie ſo deep as to be below the level of the ſea. In this manner, we conceive it to be not only poſſible, but extremely probable, that beds of lava, having no covering of vegetable ſoil, may be found at great depths, although they never were above the ſurface.

It is much more reaſonable to conclude, that lavas with a layer of ſoil were produced by eruptions, and once lay above the ſurface, till covered by the operation of time, or ſubſequent ſtreams from the mouth of the volcano. But, even in this caſe, the argument is not altogether complete; for, as above remarked, earthquakes, with which countries adjacent to volcanoes are perpetually infeſted, often ſink large tracts of land to great depths.

The other parts of the theory of the earth regard the ſituation of the different parts of its ſurface with reſpect to each other; its annual motion round the ſun as a planet; its diurnal motion round its axis; and the different ſtrata whereof it is compoſed, as far as it hath been hitherto found practicable to penetrate into it: for all which, ſee the articles GEOGRAPHY, ASTRONOMY, MINES, STRATA, *&c.*

Smell and Bath of the EARTH. See AGRICULTURE, n° 11.

Bread made of EARTH. See BREAD.

EARTH-*Flax*. See AMIANTHUS.

EARTH-*Nuts*, or *Ground-Nuts*, the roots of the ARACHIS hypogæa of Linnæus. They are compoſed of ſeveral ſmall round bulbs or knobs; whence they were termed by Dodonæus, *terræ glandes*, or *earth-nuts*. They are eſteemed an excellent food by the Siberians. In Holland likewiſe, they are ſold in the markets and uſed for food. The native country of this plant ſeems to be Africa; though, at preſent, all the American ſettlements abound with it; but many perſons who have reſided in that country affirm that they were originally brought by the ſlaves from Africa. The plant multiplies very faſt in a warm country; but being very impatient of cold, it cannot be propagated in the open air in Britain. The ſeeds muſt therefore be planted in a hot-bed in the ſpring of the year; and when the weather proves warm, they may be expoſed to the open air by degrees. The branches of the plant trail upon the ground; and the flowers, which are yellow, are produced ſingle upon long footſtalks; and as ſoon as the flower begins to decay, the germen is thruſt under ground, where the pod is formed and ripened; ſo that unleſs the ground is opened, they never appear: the roots are annual, but the nuts or ſeeds ſufficiently ſtock the ground in a warm country where they are not carefully taken up.

EARTH-*Nuts*, or *Pig-nuts*. See BUNIUM.

EARTH-*Pucerons*, in natural hiſtory, a name given by authors to a ſpecies of puceron very ſingular in its place of abode. In the month of March, if the turf be raiſed in ſeveral places in any dry paſture, there will be found, under ſome parts of it, cluſters of ants; and, on a farther ſearch, it will be uſually found, that theſe animals are gathered about ſome pucerons of a peculiar ſpecies. Theſe are large, and of a greyiſh colour, and are uſually found in the midſt of the cluſters of ants.

The common abode of the ſeveral other ſpecies of pucerons is on the young branches or leaves of trees; as their only food is the ſap or juice of vegetables, probably theſe *earth* kinds draw out thoſe juices from the roots of the graſſes, and other plants, in the ſame manner that the others do from the other parts. The ants that conduct us to theſe, are alſo our guides where to find the greater part of the others: the reaſon of which is, that as theſe creatures feed on the ſaccharine juices of plants, they are evacuated from their bodies in a liquid form, very little altered from their original ſtate; and the ants, who love ſuch food, find it ready prepared for them, in the excrements which theſe little animals are continually voiding *. It has been ſuppoſed by ſome, that theſe were the common pucerons of other kinds, which had crept into the earth to preſerve themſelves from the rigour of the winter. But this does not appear to be the caſe; for they are uſually met with in places very diſtant from trees or plants, on which they ſhould be ſuppoſed before to have fed; and it is very certain, that though many of theſe inſects are killed by the cold, yet many eſcape, and are found very early in the ſpring, ſucking the buds of the peach-tree. There is no doubt of theſe creatures being in a feeding condition when underground; becauſe otherwiſe the ants would have no temptation to follow them: and it is equally certain, that the ſeveral ſpecies of the pucerons, like thoſe of the caterpillar kinds, have each their peculiar herbs on which they feed, as many of them will die of hunger rather than feed on any others; and it is not at all likely, that theſe earth pucerons had been uſed to feed on leaves of trees and plants, and had left that food for the roots of graſs.

EARTH-*Worms*. See LUMBRICUS.

EARTHQUAKE, in natural hiſtory, a ſudden and violent concuſſion of the earth, generally attended with ſtrange noiſes under-ground or in the air; often deſtroying whole cities at once, throwing down rocks, altering the courſe of rivers, and producing the moſt terrible devaſtations.

Though there is hardly any country known in which ſhocks of an earthquake have not at ſome time or other been felt, yet there are ſome much more ſubject to

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* See *Aphis*, and *Honey-dew*.

1
What countries are moſt ſubject to earthquakes.

them than others. It hath been obſerved, that northern countries in general are leſs ſubject to earthquakes than thoſe ſituated near the equator, or in the ſouthern latitudes; but this does not hold univerſally. The iſlands of Japan, which are ſituated pretty far north, are nevertheleſs exceedingly liable to theſe deſtructive phenomena. Iſlands, in general, are alſo more ſubject to earthquakes than continents; but neither does this hold without exceptions. Some particular parts of continents, and ſome particular iſlands, are more ſubject to them than others lying in the neighbourhood, and differing very little from them in external appearance. Thus, Portugal is more ſubject to earthquakes than Spain, and the latter much more than France; Mexico and Peru more than the other countries of America, and Jamaica more than the other Caribbee Iſlands. Earthquakes are frequent, tho' not often violent, in Italy; but in Sicily they are often terribly deſtructive. Aſia Minor hath been remarkably ſubject to them from the remoteſt antiquity, and the city of Antioch in particular hath ſuffered more from earthquakes than any other in that country. The ſame phenomena are ſaid alſo to occur very frequently in the north-eaſtern extremities of Aſia, even in very high latitudes.

2
Hiſtory of their phenomena incomplete.

Though there are no phenomena in nature more calculated to impreſs the human mind with terror, and conſequently to be well remembered and taken notice of, than earthquakes, yet the philoſophy of them is but lately arrived at any degree of perfection; and even at this day, the hiſtory of earthquakes is very incomplete. The deſtruction occaſioned by them engroſſes the mind too much to admit of philoſophical ſpeculations at the time they happen: the ſame thing prevents the attentive conſideration of the alterations that take place in the atmoſphere after the earthquake is over, and which might probably throw ſome light on the cauſes which produced it; and the ſuddenneſs of its coming on prevents an exact attention to thoſe ſlight appearances in the earth or air, which, if carefully obſerved, might ſerve as warnings to avoid the deſtruction.—From what obſervations have been made, however, the following phenomena may be deduced, and reckoned pretty certain.

3
Account of the phenomena as far as yet aſcertained.

1. Where there are any volcanoes or burning mountains, earthquakes may reaſonably be expected more frequently than in other countries.

2. If the volcano hath been for a long time quiet, a violent earthquake is to be feared, *& vice verſa*. But to this there are many exceptions.

5. Earthquakes are generally preceded by long droughts; but they do not always come on as ſoon as the drought ceaſes.

4. They are alſo preceded by electrical appearances in the air; ſuch as the aurora borealis, falling ſtars, &c.: but this does not hold univerſally.

5. A ſhort time before the ſhock, the ſea ſwells up and makes a great noiſe; fountains are troubled, and ſend forth muddy water; and the beaſts ſeem frighted, as if ſenſible of an approaching calamity.

6. The air at the time of the ſhock is generally calm and ſerene; but afterwards commonly becomes obſcure and cloudy.

7. The ſhock comes on with a rumbling noiſe, ſometimes like that of carriages; ſometimes a ruſhing noiſe like wind, and ſometimes exploſions like the firing of cannon are heard. Sometimes the ground heaves perpendicularly upwards, and ſometimes rolls from ſide to ſide. Sometimes the ſhock begins with a perpendicular heave, after which the other kind of motion commences. A ſingle ſhock is but of very ſhort duration, the longeſt ſcarcely laſting a minute; but they frequently ſucceed each other at ſhort intervals for a conſiderable length of time.

8. During the ſhock, chaſms are made in the earth; from which ſometimes flames, but oftener great quantities of water, are diſcharged. Flame and ſmoke are alſo emitted from places of the earth where no chaſms can be perceived. Sometimes theſe chaſms are but ſmall; but, in violent earthquakes, they are not unfrequently ſo large, that whole cities ſink down into them at once.

9. The water of the ocean is affected even more than the dry-land. The ſea ſwells to a prodigious height; much more than we could ſuppoſe it raiſed by the mere elevation of its bottom by the ſhock. Sometimes it is divided to a conſiderable depth; and great quantities of air, flame, and ſmoke, are diſcharged from it. The like irregular agitations happen to the waters of ponds, lakes, and even rivers.

10. The ſhock is felt at ſea as well as on land. Ships are affected by a ſudden ſtroke, as if they run aground or ſtruck upon a rock.

11. The effects of earthquakes are not confined to one particular diſtrict or country, but often extend to very diſtant regions; though no earthquake hath yet been known extenſive enough to affect the whole world at one time. In thoſe places alſo where the ſhock is not felt on dry land, the irregular agitation of the waters abovementioned is perceived very remarkably.

4
Account of the earthquake in Jamaica in 1692.

All theſe poſitions are verified by the accounts of thoſe earthquakes which have been particularly deſcribed by witneſſes of the beſt character. In 1692, an earthquake happened in Jamaica, attended with almoſt all the terrible circumſtances above mentioned. In two minutes, it deſtroyed the town of Port Royal, at that time the capital of the iſland; and ſunk the houſes in a gulph 40 fathoms deep. It was attended with an hollow rumbling noiſe like that of thunder: the ſtreets roſe like the waves of the ſea; firſt lifting up the houſes, and then immediately throwing them down into deep pits. All the wells diſcharged their waters with the moſt violent agitation. The ſea burſt over its bounds, and deluged all that ſtood in its way. The fiſſures of the earth were in ſome places ſo great, that one of the ſtreets appeared twice as broad as formerly. In many places it opened and cloſed again; and continued this agitation for ſome time. Of theſe openings, great numbers might be ſeen at once. In ſome of them, the people were ſwallowed up at once; in others, the earth caught them by the middle, and cruſhed them to death; while others, more fortunate, were ſwallowed up in one chaſm, and thrown out alive by another. Other chaſms were large enough to ſwallow up whole ſtreets; and others, ſtill more formidable, ſpouted up immenſe quantities of water, drowning ſuch as the earthquake had ſpared. The whole was attended with ſtenches and offenſive ſmells, the noiſe of falling mountains at a diſtance, &c.; and the ſky, in a minute's time, was turned dull and reddiſh, like a glowing oven. Yet, as great a ſufferer as Port-Royal was, more houſes were left ſtanding therein, than on the whole iſland beſide. Scarce a planting-houſe, or ſugar-houſe, was left ſtanding in all Jamaica. A great part of them were ſwallowed up, houſes, people, trees, and all, in one gap: in lieu of which, afterwards appeared great pools of water; which, when dried up, left nothing but ſand, without any mark that ever tree or plant had grown thereon. The ſhock was ſo violent, that it threw people down on their knees or their faces as they were running about for ſhelter. Several houſes were ſhuffled ſome yards out of their places, and yet continued ſtanding. One Hopkins had his plantation removed half a mile from the place where it ſtood, without any conſiderable alteration. All the wells in the iſland, as well as thoſe of Port-Royal, from one fathom to ſix or ſeven deep, threw their water out at the top with great violence. Above 12 miles from the ſea, the earth gaped and ſpouted out, with a prodigious force, vaſt quantities of water into the air: yet the greateſt violences were among the mountains and rocks; and it is a general opinion, that the nearer the mountains, the greater the ſhock; and that the cauſe thereof lay among them. Moſt of the rivers were ſtopped up for 24 hours, by the falling of the mountains; till, ſwelling up, they made themſelves new tracks and channels; tearing up, in their paſſage, trees, &c. After the great ſhock, thoſe people who eſcaped got on board ſhips in the harbour, where many continued above two months; the ſhocks all that time being ſo violent, and coming ſo thick, ſometimes two or three in an hour, accompanied with frightful noiſes like a ruffling wind, or a hollow rumbling thunder, with brimſtone-blaſts, that they durſt not come aſhore. The conſequence of the earthquake was a general ſickneſs, from the noiſome vapours belched forth, which ſwept away above 3000 perſons.

5
f the
rthquake
Calabria
1638.

A ſtill more terrible account, if poſſible, is that given by Kircher, of the earthquake which happened in Calabria in the year 1638. This inſtance is an exception to the ſecond general poſition above laid down. In Italy, there had been an eruption of Mount Veſuvius, five years before; and in Sicily there had been an eruption of Ætna, only two years before this earthquake. The event, however, plainly ſhewed, that the cauſe of the earthquake, whatever it was, had a connection not only with Mount Ætna, which lies in the neighbourhood, but alſo with the volcano of Stromboli, which is 60 miles diſtant. "On the 24th of March, (ſays Kircher,) we lanched (in a ſmall boat) from the harbour of Meſſina in Sicily, and arrived the ſame day at the promontory of Pelorus. Our deſtination was for the city of Euphemia in Calabria; but on account of the weather, we were obliged to continue three days at Pelorus. At length, wearied with the delay, we reſolved to proſecute our voyage; and, although the ſea ſeemed more than uſually agitated, yet we ventured forward. The gulf of Charybdis, which we approached, ſeemed whirled round in ſuch a manner as to form a vaſt hollow, verging to a point in the centre. Proceeding onward, and turning my eyes to mount Ætna, I ſaw it caſt forth large volumes of ſmoke, of mountainous ſizes, which entirely covered the iſland, and blotted out even the ſhores from my view. This, together with the dreadful noiſe, and the ſulphureous ſtench, which was ſtrongly perceived, filled me with apprehenſions that ſome more dreadful calamity was impending. The ſea itſelf ſeemed to wear a very unuſual appearance; thoſe who have ſeen a lake in a violent ſhower of rain all covered over with bubbles, will have ſome idea of its agitations. My ſurpriſe was ſtill increaſed by the calmneſs and ſerenity of the weather; not a breeze, not a cloud, which might be ſuppoſed to put all nature thus into motion. I therefore warned my companions, that an earthquake was approaching; and, after ſome time, making for the ſhore with all poſſible diligence, we landed at Tropæa. But we had ſcarce arrived at the Jeſuits college in that city, when our ears were ſtunned with an horrid ſound, reſembling that of an infinite number of chariots driven fiercely forward, the wheels rattling, and the thongs cracking. Soon after this, a moſt dreadful earthquake enſued; ſo that the whole track upon which we ſtood ſeemed to vibrate, as if we were in the ſcale of a balance that continued wavering. This motion, however, ſoon grew more violent; and being no longer able to keep my legs, I was thrown proſtrate upon the ground. After ſome time, however, finding that I remained unhurt amidſt the general concuſſion, I reſolved to venture for ſafety; and running as faſt as I could, reached the ſhore. I did not ſearch long here, till I found the boat in which I had landed, and my companions alſo. Leaving this ſeat of deſolation, we proſecuted our voyage along the coaſts; and the next day came to Rochetta, where we landed, although the earth ſtill continued in violent agitations. But we were ſcarce arrived at our inn, when we were once more obliged to return to our boat; and in about half an hour, we ſaw the greateſt part of the town, and the inn at which we had ſet up, daſhed to the ground, and burying all its inhabitants beneath its ruins. Proceeding onward in our little veſſel, we at length landed at Lopizium, a caſtle mid-way between Tropæa and Euphemia the city to which we were bound. Here, wherever I turned my eyes, nothing but ſcenes of ruin and horror appeared; towns and caſtles levelled to the ground; Stromboli, though at 60 miles diſtance, belching forth flames in an unuſual manner, and with a noiſe which I could diſtinctly hear. But my attention was quickly turned from more remote, to contiguous, danger. The rumbling ſound of an approaching earthquake, which by this time we were grown acquainted with, alarmed us for the conſequences. It every moment ſeemed to grow louder, and to approach more near. The place on which we ſtood now began to ſhake moſt dreadfully; ſo that, being unable to ſtand, my companions and I caught hold of whatever ſhrub grew next us, and ſupported ourſelves in that manner. After ſome time, the violent paroxyſm ceaſing, we again ſtood up, in order to proſecute our voyage to Euphemia, which lay within ſight. In the mean time, while we were preparing for this purpoſe, I turned my eyes towards the city; but could ſee only a frightful dark cloud, that ſeemed to reſt upon the place. This the more ſurpriſed us, as the weather was ſo very ſerene. We waited, therefore, till the cloud was paſſed away: then turning to look for the city, it was totally ſunk; and nothing but a diſmal and putrid lake was to be ſeen where it ſtood."

In 1693 an earthquake happened in Sicily, which may juſtly be accounted one of the moſt terrible of which

6 Of the earthquake in Sicily in 1693.

which we have any account. It ſhook the whole iſland: and not only that, but Naples and Malta ſhared in the ſhock. It was impoſſible for any body, in this country, to keep on their legs on the dancing earth; nay, thoſe that lay on the ground were toſſed from ſide to ſide, as on a rolling billow: high walls leaped from their foundations ſeveral paces, &c. The miſchief it did is amazing: almoſt all the buildings in the countries were thrown down. Fifty-four cities and towns, beſide an incredible number of villages, were either deſtroyed or greatly damaged. We ſhall only inſtance the fate of Catania, one of the moſt famous, ancient, and flouriſhing cities in the kingdom; the reſidence of ſeveral monarchs, and an univerſity. This once famous city had the greateſt ſhare in the tragedy. Father Anthon. Serrovita, being on his way thither, and at the diſtance of a few miles, obſerved a black cloud like night hovering over the city; and there aroſe from the mouth of Montgibello, great ſpires of flame, which ſpread all around. The ſea all of a ſudden began to roar, and riſe in billows; and there was a blow, as if all the artillery in the world had been at once diſcharged. The birds flew about aſtoniſhed; the cattle in the fields ran crying, &c. His and his companions horſes ſtopped ſhort, trembling; ſo that they were forced to alight. They were no ſooner off, but they were lifted from the ground above two palms; when, caſting his eyes towards Catania, he with amazement ſaw nothing but a thick cloud of duſt in the air. This was the ſcene of their calamity: for of the magnificent Catania, there was not the leaſt footſtep to be ſeen. S. Bonajutus aſſure us, that of 18900 inhabitants, 18000 periſhed therein.

7 Phenomena of the great earthquake Novem. 1. 1755.

8 At Liſbon.

The great earthquake, however, which happened on the 1ſt of November 1755, affords the cleareſt example of all the phenomena above-mentioned; having been felt violently in many places both on land and at ſea, and extended its effects to the waters in many other places where the ſhocks were not perceived. At Liſbon in Portugal, its effects were moſt ſevere. In 1750, there had been a ſenſible trembling of the earth felt in this city: for four years afterwards, there had been an exceſſive drought; inſomuch, that ſome ſprings, formerly very plentiful of water, were dried, and totally loſt: the predominant winds were north and north-eaſt, accompanied with various, though very ſmall, tremors of the earth. The year 1755 proved very wet and rainy, the ſummer cooler than uſual; and for 40 days before the earthquake, the weather was clear, but not remarkably ſo. The laſt day of October, the ſun was obſcured, with a remarkable gloomineſs in the atmoſphere. The firſt of November, early in the morning, a thick fog aroſe, which was ſoon diſſipated by the heat of the ſun; no wind was ſtirring, the ſea was calm, and the weather as warm as in June or July in this country. At 35 minutes after nine, without the leaſt warning, except a rumbling noiſe not unlike the artificial thunder in our theatres, a moſt dreadful earthquake ſhook, by ſhort but quick vibrations, the foundations of all the city, ſo that many buildings inſtantly fell. Then, with a ſcarce perceptible pauſe, the nature of the motion was changed, and the houſes were toſſed from ſide to ſide, with a motion like that of a waggon violently driven over rough ſtones. This ſecond ſhock laid almoſt the whole city in ruins, with prodigious ſlaughter of the people. The earthquake laſted in all about ſix minutes. At the moment of its beginning, ſome perſons on the river, near a mile from the city, heard their boat make a noiſe as if it had run aground, though they were then in deep water; and at the ſame time they ſaw the houſes falling on both ſides of the river. The bed of the river Tagus was, in many places, raiſed to its ſurface. Ships were drove from their anchors, and joſtled together with great violence; nor did their maſters know whether they were afloat or aground. A large new quay ſunk to an unfathomable depth, with ſeveral hundreds of people who were upon it; nor was one of the dead bodies ever found. The bar was at firſt ſeen dry from ſhore to ſhore: but ſuddenly the ſea came rolling in like a mountain; and about Belem Caſtle, the water roſe 50 feet almoſt in an inſtant. About noon, there was another ſhock; when the walls of ſeveral houſes that yet remained, were ſeen to open from top to bottom more than a quarter of a yard, and afterwards cloſed again ſo exactly that ſcarce any mark of the injury was left.

9 At Colares.

At Colares, about 20 miles from Liſbon, and two miles from the ſea, on the laſt day of October, the weather was clear, and uncommonly warm for the ſeaſon: about four o'clock in the afternoon there aroſe a fog, which came from the ſea, and covered the valleys; a thing very unuſual at that ſeaſon of the year. Soon after, the wind changing to the eaſt, the fog returned to the ſea, collecting itſelf, and becoming exceeding thick. As the fog retired, the ſea roſe with a prodigious roaring.—The firſt of November, the day broke with a ſerene ſky, the wind continuing at eaſt: but, about nine o'clock, the ſun began to grow dim; and about half an hour after was heard a rumbling noiſe like that of chariots, which increaſed to ſuch a degree, that it became equal to the exploſions of the largeſt cannon. Immediately a ſhock of an earthquake was felt, which was quickly ſucceeded by a ſecond and third; and at the ſame time ſeveral light flames of fire iſſued from the mountains, reſembling the kindling of charcoal. In theſe three ſhocks, the walls of the buildings moved from eaſt to weſt. In another ſituation, from whence the ſea-coaſt could be diſcovered, there iſſued from one of the hills called the *Fojo*, a great quantity of ſmoke, very thick, but not very black. This ſtill increaſed with the fourth ſhock, and afterwards continued to iſſue in a greater or leſs degree. Juſt as the ſubterraneous rumblings were heard, the ſmoke was obſerved to burſt forth at the Fojo; and the quantity of ſmoke was always proportioned to the noiſe. On viſiting the place from whence the ſmoke was ſeen to ariſe, no ſigns of fire could be perceived near it.

10 At Oporto.

At Oporto (near the mouth of the river Douro), the earthquake began about 40 minutes paſt nine. The ſky was very ſerene; when a dreadful hollow noiſe like thunder, or the rattling of coaches at a diſtance, was heard, and almoſt at the ſame inſtant the earth began to ſhake. In the ſpace of a minute or two, the river roſe and fell five or ſix feet, and continued to do ſo for four hours. It ran up at firſt with ſo much violence, that it broke a ſhip's hawſer. In ſome parts the river opened, and ſeemed to diſcharge vaſt quantities of air; and the agitation in the ſea was ſo great about a league beyond the bar, that air was ſuppoſed to have been diſcharged there alſo.

Earthquake.

11
At St Ubes.

St Ubes, a ſea-port town, about 20 miles ſouth of Liſbon, was entirely ſwallowed up by the repeated ſhocks, and the vaſt ſurf the ſea. Huge pieces of rock were detached at the ſame time from the promontory at the weſt end of the town, which conſiſts of a chain of mountains containing fine jaſper of different colours.

12
At Ayamonte in Spain.

The ſame earthquake was felt all over Spain, except in Catalonia, Arragon, and Valencia.—At Ayamonte, (near where the Guadiana falls into the Bay of Cadiz), a little before 10 o'clock on the firſt of November, the earthquake was felt; having been immediately preceded by a hollow ruſhing noiſe. Here the ſhocks continued for 14 or 15 minutes, damaged almoſt all the buildings, throwing down ſome, and leaving others irreparably ſhattered. In little more than half an hour after, the ſea and river, with all the canals, overflowed their banks with great violence, laying under water all the coaſts of the iſlands adjacent to the city and its neighbourhood, and flowing into the very ſtreets. The water came on in vaſt black mountains, white with foam at the top, and demoliſhed more than one half of a tower at the bar named *de Canala*. In the adjacent ſtrands every thing was irrecoverably loſt; for all that was overflowed ſunk, and the beach became a ſea, without the leaſt reſemblance of what it was before. Many perſons periſhed: for, although they got aboard ſome veſſels, yet part of theſe foundered; and others being forced out to ſea, the unhappy paſſengers were ſo terrified, that they threw themſelves over board. The day was ſerene, and not a breath of wind ſtirring.

13
At Cadiz.

At Cadiz, ſome minutes after nine in the morning the earthquake began, and laſted about five minutes. The water of the ciſterns under ground waſhed backwards and forwards, ſo that a great froth aroſe. At ten minutes after eleven, a wave was ſeen coming from the ſea, at eight miles diſtance, at leaſt 60 feet higher than uſual. It daſhed againſt the weſt part of the town, which is very rocky. Though theſe rocks broke a good deal of its force, it at laſt came upon the city walls, beat in the breaſt-work, and carried pieces of the building of eight or ten ton weight to the diſtance of 40 or 50 yards.—When the wave was gone, ſome parts that are deep at low water, were left quite dry; for the water returned with the ſame violence with which it came. At half an hour after 11 came a ſecond wave, and after that four other remarkable ones; the firſt at ten minutes before twelve; the ſecond, half an hour before one; the third, ten minutes after one; and the fourth, ten minutes before two. Similar waves, but ſmaller, and gradually leſſening, continued with uncertain intervals till the evening.

14
At Gibraltar.

At Gibraltar, the earthquake was not felt till after ten. It began with a tremulous motion of the earth, which laſted about half a minute. Then followed a violent ſhock; after that, a trembling of the earth for five or ſix ſeconds; then another ſhock not ſo violent as the firſt, which went off gradually as it began. The whole laſted about two minutes. Some of the guns on the battery were ſeen to riſe, others to ſink, the earth having an undulating motion. Moſt people were ſeized with giddineſs and ſickneſs; and ſome fell down: others were ſtupified; and many that were walking or riding felt no motion in the earth, but were ſick. The ſea roſe ſix feet every 15 minutes; and then fell ſo low, that boats, and all the ſmall craft near the ſhore, were left aground, as were alſo numbers of ſmall fiſh. The flux and reflux laſted till next morning, having decreaſed gradually from two in the afternoon.

Earthquake.

15
At Madrid, Malaga, &c.

At Madrid the earthquake came on at the ſame time as at Gibraltar, and laſted about ſix minutes. At firſt every body thought they were ſeized with a ſwimming in their heads; and afterwards, that the houſes were falling. It was not felt in coaches, nor by thoſe who walked on foot, except very ſlightly; and no accident happened, except that two lads were killed by the fall of a ſtone-croſs from the porch of a church.

Malaga (a ſea-port on the Mediterranean) felt a violent ſhock; the bells rung in the ſteeples; the water of a well overflowed, and as ſuddenly retired.

Saint Lucar (at the mouth of the Guadalquiver) was violently ſhocked, and the ſea broke in and did a great deal of miſchief.

At Seville, (16 leagues above the mouth of the Guadalquiver), ſeveral houſes were ſhaken down; the famous tower of the cathedral called *la Giralda* opened in the four ſides; and the waters were ſo violently agitated, that all the veſſels in the river were driven aſhore.

16
At Arzilla in Africa.

In Africa, the earthquake was felt almoſt as ſeverely as it had been in Europe. Great part of the town of Algiers was deſtroyed. At Arzilla, (a town in the kingdom of Fez), about ten in the morning, the ſea ſuddenly roſe with ſuch impetuoſity, that it lifted up a veſſel in the bay, and dropped it with ſuch force on the land, that it was broke to pieces; and a boat was found two muſket-ſhot within land from the ſea. At Fez, and Mequinez, great numbers of houſes fell down, and a multitude of people were buried in the ruins.

17
At Morocco.

At Morocco, by the falling down of a great number of houſes, many people loſt their lives: and about eight leagues from the city, the earth opened and ſwallowed up a village with all the inhabitants, who were known by the name of the *ſons of Beſumba*, to the number of about 8000 or 10,000 perſons, together with all their cattle, &c.; and, ſoon after, the earth cloſed again in the ſame manner as before.

18
At other places on the African coaſt.

At Salle, a great deal of damage was done. Near a third part of the houſes were overthrown; the waters ruſhed into the city with great rapidity, and left behind them great quantities of fiſh.

At Tangier, the earthquake began at ten in the morning, and laſted 10 or 12 minutes. The ſea came up to the walls (a thing never heard of before); and went down immediately with the ſame rapidity with which it aroſe, leaving a great quantity of fiſh behind it: theſe commotions were repeated 18 times, and laſted till ſix in the evening.

At Tetuan, the earthquake began at the ſame time it did at Tangier, but laſted only ſeven or eight minutes. There were three ſhocks, ſo extremely violent, that it was feared the whole city would be deſtroyed.

19
In the iſland of Madeira.

In the city of Funchal, in the iſland of Madeira, a ſhock of this earthquake was firſt perceived at 38 minutes paſt nine in the morning. It was preceded by a rumbling noiſe in the air, like that of empty carriages paſſing haſtily over a ſtone pavement. The obſerver felt the floor immediately to move with a tremulous motion, vibrating very quickly. The ſhock continued more than a minute; during which ſpace, the vibrations, though continual, were weakened and increaſed in force twice very ſenſibly. The increaſe after the firſt remiſſion of the ſhock, was the moſt intenſe. The noiſe in the air accompanied the ſhock during the whole of its continuance, and laſted ſome ſeconds after the motion of the earth had ceaſed; dying away like a peal of diſtant thunder rolling through the air. At three quarters paſt eleven, the ſea, which was quite calm, it being a fine day, and no wind ſtirring, retired ſuddenly ſome paces; then riſing with a great ſwell without the leaſt noiſe, and as ſuddenly advancing, overflowed the ſhore, and entered the city. It roſe 15 feet perpendicular above the high-water mark, although the tide, which flows there ſeven feet, was then at half ebb. The water immediately receded; and after having fluctuated four or five times between high and low water mark, it ſubſided, and the ſea remained calm as before. In the northern part of the iſland the inundation was more violent, the ſea there retiring above 100 paces at firſt, and ſuddenly returning, overflowed the ſhore, forcing open doors, breaking down the walls of ſeveral magazines and ſtorehouſes, leaving great quantities of fiſh aſhore and in the ſtreets of the village of Machico. All this was the effect of one riſing of the ſea, for it never afterwards flowed high enough to reach the high-water mark. It continued, however, to fluctuate here much longer before it ſubſided than at Funchal; and in ſome places farther to the weſtward, it was hardly, if it all, perceptible.

20
Effects of it in Norway and Sweden.

Theſe were the phenomena with which this remarkable earthquake was attended in thoſe places where it was violent. The effects of it, however, reached to an immenſe diſtance; and were perceived chiefly by the agitations of the waters, or ſome ſlight motion of the earth. The utmoſt boundaries of this earthquake to the ſouth are unknown; the barbarity of the African nations rendering it impoſſible to procure any intelligence from them, except where the effects were dreadful. On the north, however, we are aſſured, that it reached as far as Norway and Sweden. In the former, the waters of ſeveral rivers and lakes were violently agitated. In the latter, ſhocks were felt in ſeveral provinces, and all the rivers and lakes were ſtrongly agitated, eſpecially in Dalecarlia. The river Dala ſuddenly overflowed its banks, and as ſuddenly retired. At the ſame time a lake at the diſtance of a league from it, and which had no manner of communication with it, bubbled up with great violence. At Fahlun, a town in Dalecarlia, ſeveral ſtrong ſhocks were felt.

21
In Germany.

In many places of Germany the effects of the earthquake were very perceptible. Throughout the duchy of Holſtein, the waters were violently agitated, particulary thoſe of the Elbe and Trave. In Brandenburg, the water of a lake called *Libſec*, ebbed and flowed ſix times in half an hour, with a dreadful noiſe, the weather being then perfectly calm. The ſame agitation was obſerved in the waters of the lakes called *Muplgaſt* and *Netzo*; but at this laſt place they alſo emitted an intolerable ſtench.

22
In Holland.

In Holland, the agitations were more remarkable. At Alphen on the Rhine between Leyden and Woerden, in the afternoon of the firſt of November, the waters were agitated to ſuch a violent degree, that buoys were broken from their chains, large veſſels ſnapped their cables, ſmaller ones were thrown out of the water upon the land, and others lying on land were ſet afloat. At Amſterdam, about eleven in the forenoon, the air being perfectly calm, the waters were ſuddenly agitated in their canals, ſo that ſeveral boats broke looſe; chandeliers were obſerved to vibrate in the churches; but no motion of the earth, or concuſſion of any building, was obſerved. At Harlem, in the forenoon, for near four minutes together, not only the water in the rivers, canals, &c. but alſo all kinds of fluids in ſmaller quantities, as in coolers, tubs, backs, &c. were ſurpriſingly agitated, and daſhed over the ſides, though no motion was perceptible in the veſſels themſelves. In theſe ſmall quantities alſo the fluid apparently aſcended prior to its turbulent motion; and in many places, even the rivers and canals roſe 12 inches perpendicular. At Leyden, between half an hour after 10 and 11 in the forenoon, the waters roſe ſuddenly in ſome of the canals, and made ſeveral very ſenſible undulations, ſo that the boats were ſtrongly agitated. The ſame motion was perceived in the water of the backs of two brew-houſes.

Round the iſland of Corſica, the ſea was violently agitated, and moſt of the rivers of the iſland overflowed their banks.—In the city of Milan in Italy, and throughout that diſtrict, ſhocks were felt. At Turin in Savoy, there was felt a very violent ſhock.

23
In Italy and Switzerland.

In Swiſſerland, many rivers turned ſuddenly muddy without rain. The lake of Neufchatel ſwelled to the height of near two feet above its natural level, for the ſpace of a few hours.—An agitation was alſo perceived in the waters of the lake of Zurich.

24
At Antigua and Barbadoes.

At the iſland of Antigua, there was ſuch a ſea without the bar as had not been known in the memory of man; and after it, all the water at the wharfs, which uſed to be ſix feet deep, was not two inches.—At Barbadoes, about two in the afternoon, the ſea ebbed and flowed in a ſurpriſing manner. It ran over the wharfs and ſtreets into the houſes, and continued thus ebbing and flowing till ten at night.

25
In England.

The agitation of the waters was perceived in great numbers of places in Great Britain and Ireland.—Accounts of the moſt remarkable of them follow. At Barlborough in Derbyſhire, between 11 and 12 in the forenoon, in a boat-houſe on the weſt ſide of a large body of water called *Pibley Dam*, ſuppoſed to cover at leaſt 30 acres of land, was heard a ſurpriſing and terrible noiſe; a large ſwell of water came in a current from the ſouth, and roſe two feet on the ſloped dam-head at the north end of the water. It then ſubſided; but returned again immediately, though with leſs violence. The water was thus agitated for three quarters of an hour; but the current grew every time weaker and weaker, till at laſt it entirely ceaſed.

At Buſbridge in Surrey, at half an hour after ten in the morning, the weather being remarkably ſtill, without the leaſt wind, in a canal near 700 feet long and 58 feet broad, with a ſmall ſpring conſtantly running through it, a very unuſual noiſe was heard at the eaſt end, and the water there obſerved to be in great agitation. It raiſed itſelf in a heap or ridge in the middle; and this heap extended lengthwiſe about 30 yards, riſing between two or three feet above the uſual level. After this, the ridge heeled or vibrated towards the north ſide of the canal with great force, and flowed above eight feet over the graſs walk on that ſide. On its return back into the canal, it again ridged in the middle, and then heeled with yet greater force to the ſouth ſide, and flowed over its graſs walk. During this latter motion, the bottom on the north ſide was left dry for ſeveral feet. This appearance laſted for about a quarter of an hour, after which the water became ſmooth and quiet as before. During the whole time, the ſand at the bottom was thrown up and mixed with the water; and there was a continual noiſe like that of water turning a mill.

At Cobham in Surrey, between 10 and 11 o'clock, a perſon was watering a horſe at a pond fed by ſprings. Whilſt the animal was drinking, the water ſuddenly ran away from him, and moved towards the ſouth with ſuch ſwiftneſs, that the bottom of the pond was left bare. It returned again with ſuch impetuoſity, that the man leaped backwards to ſecure himſelf from its ſudden approach. The ducks were alarmed at the firſt agitation, and inſtantly flew all out of the pond.

At Dunſtall in Suffolk, the water of a pond roſe gradually for ſeveral minutes in the form of a pyramid, and fell down like a water-ſpout. Other ponds in the neighbourhood had a ſmooth flux and reflux from one end to the other.

Near the city of Durham, about half an hour after ten, a gardener was alarmed by a ſudden ruſhing noiſe from a pond, as if the head of the pond had been broken down: when, caſting his eye on the water, he ſaw it gradually riſe up, without any fluctuating motion, till it reached a grate which ſtood ſome inches higher than the common water level. After this it ſubſided, and then ſwelled again; thus continuing to riſe and fall during the ſpace of ſix or ſeven minutes, making four or five returns in the ſpace of one minute. The pond was about 40 yards long, and 10 broad.

At Early Court, Berks, about 11 o'clock, as a gardener was ſtanding by a fiſh-pond, he felt a violent trembling of the earth, which laſted about a minute. Immediately after, he obſerved a motion of the water from the ſouth to the north end of the pond, leaving the bottom at the ſouth end altogether dry for about ſix feet. It then returned, and flowed at the ſouth end, riſing three feet up the ſlope bank; and immediately after returned to the north bank, riſing there alſo about three feet. In the time between the flux and reflux, the water ſwelled up in the middle of the pond, collected in a ridge about 20 inches higher than the level on each ſide, and boiled like a pot. This agitation from ſouth to north laſted about four minutes.

At Eaton-bridge, Kent, in a pond about an acre in ſize, a dead calm, and no wind ſtirring, ſome perſons heard a noiſe, and imagining ſomething had been tumbling in, ran to ſee what was the matter. On their arrival at the pond, to their ſurpriſe they ſaw the water open in the middle, ſo that they could ſee a poſt a good way down, almoſt to the bottom. The water in the mean time daſhed up over a bank two feet high, and perpendicular to the pond. This was repeated ſeveral times with a great noiſe.

At Eyam bridge, Derbyſhire, (in the Peak), the overſeer of the lead-mines ſitting in his writing-room about 11 o'clock, felt a ſudden ſhock, which very ſenſibly raiſed him up in his chair, and cauſed ſeveral pieces of plaſter to drop from the ſides of the room. The roof was ſo violently ſhaken, that he imagined the engine ſhaft had been falling in. Upon this he immediately ran to ſee what was the matter, but found every thing in perfect ſafety. – At this time two miners were employed in carting, or drawing along the drifts of the mines, the ore, and other materials, to be raiſed up at the ſhafts. The drift in which they were working was about 120 yards deep, and the ſpace from one end to the other 50 yards or upwards. The miner at the end of the drift had juſt loaded his cart, and was drawing it along; but he was ſuddenly ſurpriſed by a ſhock, which ſo terrified him, that he immediately quitted his employment, and ran to the weſt end of the drift to his partner, who was no leſs terrified than himſelf. They durſt not attempt to climb the ſhaft, leſt that ſhould be running in upon them: but while they were conſulting what means they ſhould take for their ſafety, they were ſurpriſed by a ſecond ſhock more violent than the firſt; which frightened them ſo much, that they both ran precipitately to the other end of the drift. They then went down to another miner who worked about 12 yards below them. He told them that the violence of the ſecond ſhock had been ſo great, that it cauſed the rocks grind upon one another. His account was interrupted by a third ſhock, which, after an interval of four or five minutes, was ſucceeded by a fourth; and, about the ſame ſpace of time after, by a fifth; none of which were ſo violent as the ſecond. They heard, after every ſhock, a loud rumbling in the bowels of the earth, which continued about half a minute, gradually decreaſing, or ſeeming to remove to a greater diſtance.

At Shireburn caſtle, Oxfordſhire, at a little after ten in the morning, a very ſtrange motion was obſerved in the water of a moat which encompaſſes the houſe. There was a pretty thick fog, not a breath of air, and the ſurface of the water all over the moat as ſmooth as a looking-glaſs, except at one corner, where it flowed into the ſhore, and retired again ſucceſſively, in a ſurpriſing manner. In what manner it began to move is uncertain, as nobody obſerved the beginning of its motion. The flux and reflux, when ſeen, were quite regular. Every flood began gently; its velocity increaſed by degrees, when at laſt it ruſhed in with great impetuoſity, till it had attained its full height. Having remained for a little time ſtationary, it then retired, ebbing gently at firſt, but afterwards ſinking away with great ſwiftneſs. At every flux, the whole body of water ſeemed to be violently thrown againſt the bank; but neither during the time of the flux nor that of the reflux, did there appear even the leaſt wrinkle of a wave on the other parts of the moat. Lord Viſcount Parker, who had obſerved this motion, being deſirous to know whether it was univerſal over the moat, ſent a perſon to the other corner of it, at the ſame time that he himſelf ſtood about 25 yards from him, to examine whether the water moved there or not. He could perceive no motion there, or hardly any: but another, who went to the north-eaſt corner of the moat, diagonally oppoſite to his lordſhip, found it as conſiderable there as where he was. His lordſhip imagining, that in all probability the water at the corner diagonally oppoſite to where he was would ſink as that by him roſe, he ordered the perſon to ſignify by calling out, when the water by him began to ſink, and when to riſe. This he did; but, to his lordſhip's great ſurpriſe, immediately after the water began to riſe at his own end, he heard his voice calling that it began to riſe with him alſo; and in the ſame manner he heard that it was ſinking at his end, ſoon after he perceived it to ſink by himſelf. A pond juſt below was agitated in a ſimilar manner; but the riſings and ſinkings of it happened at different times from thoſe at the pond where lord Parker ſtood.

At White Rock in Glamorganſhire, about two hours ebb of the tide, and near three quarters after ſix in the evening, a vaſt quantity of water ruſhed up with a prodigious noiſe; floated two large veſſels, the leaſt of them above 200 tons; broke their moorings, drove them acroſs the river, and had like to have overſet them. The whole riſe and fall of this extraordinary body of water did not laſt above ten minutes, nor was it felt in any other part of the river, ſo that it ſeemed to have guſhed out of the earth at that place.

26
In Scotland.

At Loch Lomond in Scotland, about half an hour after nine in the morning, all of a ſudden, without the leaſt guſt of wind, the water roſe againſt its banks with great rapidity, but immediately ſubſided, till it was as low in appearance as any body then preſent had ever ſeen it in the greateſt ſummer-drought. Inſtantly it returned towards the ſhore, and in five minutes time roſe again as high as before. The agitation continued at the ſame rate till 15 minutes after ten the ſame morning; taking five minutes to riſe, and as many to ſubſide. From 15 minutes after 10 till 11, the height of every riſe came ſomewhat ſhort of that immediately preceding, taking five minutes to flow, and as many to ebb, till the water was entirely ſettled. The greateſt perpendicular height of this ſwell was two feet four inches.

In Loch Neſs, about half an hour after nine, a very great agitation was obſerved in the water. About ten the river Oich, which runs on the north ſide of Fort Auguſtus, into the head of the loch, was obſerved to ſwell very much, and run upwards from the loch with a pretty high wave, about two or three feet higher than the ordinary ſurface. The motion of the wave was againſt the wind, and it proceeded rapidly for about 200 yards up the river. It then broke on a ſhallow, and flowed three or four feet on the banks, after which it returned gently to the loch. It continued ebbing and flowing in this manner for about an hour, without any ſuch remarkable waves as the firſt; but about 11 o'clock, a wave higher than any of the reſt came up, and broke with ſo much force on the low ground on the north ſide of the river, that it run upon the graſs upwards of 30 feet from the river's bank.

27
In Ireland.

At Cork, in Ireland, about 36 minutes after nine, ſhocks of an earthquake were plainly felt, at about half a minute's interval. At Kinſale, between two and three in the afternoon, the weather being very calm, and the tide near full, a large body of water ſuddenly poured into the harbour with ſuch rapidity, that it broke the cables of two ſloops, each moored with two anchors, and of ſeveral boats lying between Sicily and the town. They were driven up and down the harbour with prodigious velocity. But, juſt at the time that a great deal of miſchief was apprehended by all the veſſels running foul of each other, an eddy whirled them round ſeveral times, and then hurried them back again with the ſame rapidity as before. This was ſeveral times repeated; and while the current ruſhed up at one ſide of the harbour, it poured down with equal violence at the other. A veſſel that lay all this time in the pool did not ſeem to be any ways affected by it; nor was the violence of the currents much perceived in the deeper parts of the harbour, but raged with moſt violence on the flats. The bottom of the harbour, which is muddy, was much altered; the mud being waſhed from ſome places, and depoſited in others. The perpendicular riſe of the water at one quay was meaſured, and found to be five feet and an half; and is ſaid to have been much higher at another, where it overflowed, and poured into the market-place with ſuch rapidity, that ſome people who were on the quay immediately ran off, and yet could not prevent themſelves from being overtaken and immerſed knee-deep in the water. The agitations extended ſeveral miles up the river; but, as in the harbour, were moſt perceived in the ſhalloweſt places. The ſucceſſive riſings and fallings of the water continued about ten minutes, and then the tide returned to its natural courſe. Between ſix and ſeven in the evening, the water roſe again, tho' not with ſo great violence as before, and it continued to ebb and flow alternately till three in the morning. The waters did not riſe gradually at firſt; but, with a hollow and horrid noiſe, ruſhed in like a deluge, riſing ſix or ſeven feet in a minute, and as ſuddenly ſubſiding. They were as thick as puddle, very black, and ſtank intolerably.—From different accounts it appeared, that the water was affected in a ſimilar manner all along the coaſt to the weſtward of Kinſale.

28
In France.

In France, ſhocks were perceived in ſeveral places; as at Bayonne, Bourdeaux, and Lyons. Commotions of the waters alſo were obſerved at Angouleſme, Bleville, Havre de Grace, &c. but not attended with the remarkable circumſtances above-mentioned.

29
Its effects on ſprings, and on the earth itſelf.

Theſe are the moſt ſtriking phenomena with which the earthquake of Nov. 1. 1755 was attended on the ſurface of the earth. Thoſe which happened below ground cannot be known but by the changes obſerved in ſprings, &c. which were in many places very remarkable.—At Colares, on the afternoon of the 31ſt of October, the water of a fountain was greatly decreaſed: on the morning of the firſt of November it ran very muddy; and, after the earthquake, returned to its uſual ſtate both as to quantity and clearneſs. On the hills, numbers of rocks were ſplit; and there were ſeveral rents in the ground, but none conſiderable. In ſome places where formerly there had been no water, ſprings burſt forth, which continued to run.—Some of the largeſt mountains in Portugal were impetuouſly ſhaken as it were from their foundation; moſt of them opened at their ſummits, ſplit and rent in a wonderful manner, and huge maſſes of them were thrown down into the ſubjacent valleys.—From the rock called *Pedra de Alvidar*, near the hill Fojo, a kind of parapet was broken off, which was thrown up from its foundation in the ſea.—At Varge, on the river Macaas, at the time of the earthquake, many ſprings of water burſt forth, ſome ſpouted to the height of 18 or 20 feet, throwing up ſand of various colours, which remained on the ground. A mountainous point, ſeven or eight leagues from St Ubes, cleft aſunder, and threw off ſeveral vaſt maſſes of rock.—In Barbary, a large hill was rent in two; the two halves fell different ways, and buried two large towns. In another place, a mountain burſt open, and a ſtream iſſued from it as red as blood. At Tangier, all the fountains were dried up, ſo that there was no water to be had till night.—A very remarkable change was obſerved on the medicinal waters of Toplitz, a village in Bohemia famous for its baths. Theſe waters were diſcovered in the year 762; from which time the principal ſpring of them had conſtantly thrown out hot water in the ſame quantity, and of the ſame quality. On the morning of the earthquake, between 11 and 12 in the forenoon, the principal ſpring caſt forth ſuch a quantity of water, that in the ſpace of half an hour all the baths ran over. About half an hour before this great increaſe of the water, the ſpring flowed turbid and muddy; then having ſtopped entirely for a minute, it broke forth again with prodigious violence, driving before it a conſiderable quantity of reddiſh oker. After this it became clear, and flowed as pure as before. It ſtill continues to do ſo; but the water is in greater quantity, and hotter, than before the earthquake. At Angouleſme in France, a ſubterraneous noiſe like thunder was heard; and preſently after, the earth opened, and diſcharged a torrent of water mixed with red ſand. Moſt of the ſprings in the neighbourhood ſunk in ſuch a manner, that for ſome time they were thought to be quite dry. In Britain, no conſiderable alteration was obſerved in the earth, except that, near the lead mine abovementioned in Derbyſhire, a cleft was obſerved about a foot deep, ſix inches wide, and 150 yards in length.

30
ffects of
e earth-
uake at
a.

At ſea, the ſhocks of this earthquake were felt moſt violently.—Off St Lucar, the captain of the Nancy frigate felt his ſhip ſo violently ſhaken, that he thought ſhe had ſtruck the ground; but, on heaving the lead, found he was in a great depth of water. Captain Clark from Denia, in Lat. 36. 24. between nine and ten in the morning, had his ſhip ſhaken and ſtrained as if ſhe had ſtruck upon a rock, ſo that the ſeams of the deck opened, and the compaſs was overturned in the binacle. The maſter of a veſſel bound to the American iſlands, being in N. Lat. 25°, W. Long. 40°, and writing in his cabin, heard a violent noiſe, as he imagined, in the ſteerage; and while he was aſking what the matter was, the ſhip was put into a ſtrange agitation, and ſeemed as if ſhe had been ſuddenly jerked up and ſuſpended by a rope faſtened to the maſt-head. He immediately ſtarted up with great terror and aſtoniſhment; and looking out at the cabin-window, ſaw land, as he took it to be, at the diſtance of about a mile. But, coming upon the deck, the land was no more to be ſeen, but he perceived a violent current croſs the ſhip's way to the leeward. In about a minute, this current returned with great impetuoſity, and at a league's diſtance he ſaw three craggy-pointed rocks throwing up water of various colours reſembling fire. This phenomenon, in about two minutes, ended in a black cloud, which aſcended very heavily. After it had riſen above the horizon, no rocks were to be ſeen; though the cloud, ſtill aſcending, was long viſible, the weather being extremely clear.—Between nine and ten in the morning, another ſhip, 40 leagues weſt of St Vincent, was ſo ſtrongly agitated, that the anchors, which were laſhed, bounced up, and the men were thrown a foot and an half perpendicularly up from the deck. Immediately after this, the ſhip ſunk in the water as low as the main chains. The lead ſhewed a great depth of water, and the line was tinged of a yellow colour and ſmelt of ſulphur. The ſhock laſted about ten minutes, but they felt ſmaller ones for the ſpace of 24 hours.

Theſe are the phenomena which attended this moſt remarkable earthquake in many parts of the world. We have accounts of its effects over the ſpace of 4,000,000 ſquare miles, and undoubtedly it would be felt in a ſmall degree much farther to the ſouthward than we can have any account of.—To explain the phenomena of earthquakes, various hypotheſes have been invented. Till lately, the hypotheſis of the modern philoſophers was much the ſame with that of the ancients. Anaxăgoras ſuppoſed the cauſe of earthquakes to be ſubterraneous clouds burſting out into lightning, which ſhook the vaults that confined them. Others imagined, that the arches, which had been weakened by continual ſubterraneous fires, at length fell in: Others derived theſe accidents from the rarefied ſteam of waters, heated by ſome neighbouring fires; and ſome, among whom was Epicurus, and ſeveral of the Peripatetic ſchool, aſcribed theſe terrible accidents to the ignition of certain inflammable exhalations.

31
Hypotheſes
concerning
the cauſe of
earthquakes.

This laſt hypotheſis has been adopted by many of the moſt celebrated moderns, as Gaſſendus, Kircher, Schottus, Varenius, Des Cartes, Du Hamel, Honorius Fabri, &c. The philoſopher laſt mentioned indeed ſuppoſed, that waters prodigiouſly rarefied by heat might ſometimes occaſion earthquakes. The others ſuppoſed, as their hypotheſis neceſſarily requires, that there are many and vaſt cavities underground which have a communication with one another; ſome of which abound with waters; others with vapours and exhalations, ariſing from inflammable ſubſtances, as nitre, bitumen, ſulphur, &c. Theſe combuſtible exhalations they ſuppoſed to be kindled by a ſubterraneous ſpark, or by ſome active flame gliding through a narrow fiſſure from without, or by the fermentation of ſome mixture; and when this happened, they muſt neceſſarily produce pulſes, tremors, and ruptures at the ſurface, according to the number and diverſity of the cavities, and the quantity and activity of the inflammable matter. This hypotheſis is illuſtrated by a variety of experiments, ſuch as mixtures of iron-filings and brimſtone buried in the earth, gun-powder confined in pits, &c. by all which a ſhaking of the earth will be produced.

32
Hypotheſis
of Dr
Woodward.

Dr Woodward ſuggeſts another hypotheſis. He ſuppoſes that the ſubterraneous heat or fire, which is continually elevating water out of the abyſs, which, according to him, occupies the centre of the earth, to furniſh rain, dew, ſprings, and rivers, may be ſtopped in ſome particular part. When this obſtruction happens, the heat cauſes a great ſwelling and commotion in the waters of the abyſs: and at the ſame time, making the like effort againſt the ſuperincumbent earth, that agitation and concuſſion of it is occaſioned which we call an earthquake.

33
Of Mr Amontons.

Mr Amontons of the Royal Academy of Sciences ſuggeſts an hypotheſis entirely different from any of the abovementioned ones. According to the received philoſophical principles, which ſuppoſe the atmoſphere to be about 45 miles high, and that the denſity of the air increaſes in proportion to the abſolute height of the ſuperincumbent column of fluid; it is ſhewn, that at the depth of 43,528 fathoms below the ſurface of the earth, air is but one fourth lighter than mercury. Now, this depth of 43,528 fathoms is only a 74th part of the ſemi-diameter of the earth. And the vaſt ſphere beyond this depth, in diameter 6,451,538 fathoms, may probably be only filled with air; which will be here greatly condenſed, and much heavier than the heavieſt bodies we know of in nature. But it is found by experiment, that the more air is compreſſed, the more does the ſame degree of heat increaſe its ſpring, and the more capable does it render it of a violent effect; and that, for inſtance, the degree of heat of boiling water increaſes the ſpring of the air above what it has in its natural ſtate, in our climate, by a quantity equal to a third of the weight wherewith it is preſſed. Whence we may conclude, that a degree of heat, which on the ſurface of the earth will only have a moderate effect, may be capable of a very violent one below. And as we are aſſured, that there are in nature degrees of heat much more conſiderable than that of boiling water, it is very poſſible there may be ſome, whoſe violence, further aſſiſted by the exceeding weight of the air, may be more than ſufficient to break and overturn this ſolid orb of 43,528 fathoms; whoſe weight, compared to that of the included air, would be but a trifle.

34 All theſe hypotheſes rejected by Dr Stukely.

Though none of theſe hypotheſes were ſufficient for explaining the phenomena of earthquakes in a ſatisfactory manner, one or other of them continued to be adopted by almoſt all philoſophers, till the year 1749. In the month of March that year, an earthquake was felt at London and ſeveral other places in Britain. Dr Stukely, who had been much engaged in electrical experiments, began to ſuſpect that phenomena of this kind ought to be attributed not to vapours or fermentations generated in the bowels of the earth, but to electricity. In a paper publiſhed by him on this ſubject, he rejects all the above-mentioned hypotheſes for the following reaſons.

1. That there is no evidence of any remarkable cavernous ſtructure of the earth; but that, on the contrary, there is rather reaſon to preſume that it is in a great meaſure ſolid, ſo as to leave little room for internal changes and fermentations within its ſubſtance; nor do coal-pits, he ſays, when on fire, ever produce any thing reſembling an earthquake.

2. In the earthquake at London, in March 1749, there was no ſuch thing as fire, vapour, ſmoke, ſmell, or an eruption of any kind obſerved, though the ſhock affected a circuit of 30 miles in diameter. This conſideration alone of the extent of ſurface ſhaken by an earthquake, he thought ſufficient to overthrow the ſuppoſition of its being owing to the expanſion of any ſubterraneous vapours. For as ſmall fire-balls burſting in the air propagate a ſulphureous ſmell to the diſtance of ſeveral miles, it cannot be ſuppoſed, that ſo immenſe a force acting inſtantaneouſly on that compaſs of ground ſhould never break the ſurface of it, nor become diſcoverable either to the ſight or the ſmell: beſides, that the operation of ſuch a fermentation would be many days in continuance, and the evaporation of ſo much inflammable matter would require a long ſpace of time. That ſuch an effect, therefore, ſhould be produced inſtantaneouſly, can be accounted for by electricity only; which acknowledges no ſenſible tranſition of time, no bounds.

3. If vapours, and ſubterraneous fermentations, exploſions, and eruptions, were the cauſe of earthquakes, they would abſolutely ruin the whole ſyſtem of ſprings and fountains, wherever they had once been; which is contrary to fact, even when they have been frequently repeated. Even in the earthquake in Aſia Minor, A. D. 17, which deſtroyed 13 great cities, and ſhook a maſs of earth 300 miles in diameter, nothing ſuffered but the cities; neither the ſprings nor the face of the country being injured, which indeed remains the ſame to this day.

4. That any ſubterraneous power ſufficient to move 30 miles in diameter, as in the earthquake which happened at London, muſt be lodged at leaſt 15 or 20 miles below the ſurface; and therefore muſt move an inverted cone of ſolid earth, the baſe of which is 30 miles in diameter, and the axis 15 or 20; an effect impoſſible to any natural power whatever, except electricity. So in Aſia Minor, ſuch a cone muſt have been 300 miles in the diameter of the baſe, and 200 in the axis; which not all the gun-powder that has been made ſince the invention of it, much leſs any vapours generated ſo far below the ſurface, could poſſibly effect.

5. A ſubterraneous exploſion will not account for the manner in which ſhips, far from land, are affected during an earthquake: which ſeem as if they ſtruck upon a rock, or as if ſomething thumped againſt their bottoms. Even the fiſhes are affected. A ſubterraneous exploſion could only produce a gradual ſwell, and not give ſo quick an impulſe to the water as would make it feel like a ſtone.

35 His method of accounting for earthquakes.

From comparing theſe circumſtances, the Doctor ſays, he had always thought that an earthquake was a ſhock of the ſame kind as thoſe which commonly occur in electrical experiments. And this hypotheſis was confirmed by the phenomena attending earthquakes; particularly thoſe of 1749 and 1750, which gave riſe to his publication.

The weather, for five or ſix months before, had been uncommonly warm; the wind ſouth and ſouth-weſt, without rain; ſo that the earth muſt have been in a ſtate peculiarly ready for an electrical ſhock. The flat country of Lincolnſhire had been under an exceeding great drought. The uncommonneſs of the firſt of theſe circumſtances, he remarks, is the reaſon why earthquakes are leſs frequently experienced in the northern than in the ſouthern regions of the world, where the warmth and dryneſs of the air, ſo neceſſary to electricity, are more uſual: And the latter ſhows how fit the dry ſurface was for an electrical vibration; and (which is of great importance) that earthquakes reach but little below the ſurface of the earth.

Before the earthquake at London, all vegetables had been uncommonly forward. And electricity is well known to quicken vegetation. The aurora borealis had been frequent about that time; and, juſt before the earthquake, had been twice repeated in ſuch colours as had never been ſeen before. It had alſo removed ſoutherly, contrary to what is common in England; ſo that the Italians, and thoſe among whom earthquakes were frequent, actually foretold the earthquake. The year had been remarkable for fire-balls, lightning, and coruſcations; and theſe are rightly judged to be meteors of an electrical nature.

In theſe circumſtances of the earth and air, nothing, he ſays, is wanting to produce an earthquake, but the touch of ſome non-electric body; which muſt neceſſarily be had *ab extra*, from the region of the air or atmoſphere. Hence he infers, that, if a non-electric cloud diſcharge its contents upon any part of the earth, in that highly electrical ſtate, an earthquake muſt neceſſarily enſue. As the diſcharge from an excited tube produces a commotion in the human body, ſo the diſcharge of electric matter from the compaſs of many miles of ſolid earth, muſt needs be an earthquake; and the ſnap from the contact, the horrid uncouth noiſe attending it.

The Doctor had been informed, by thoſe who were up and abroad the night preceding the earthquake, and early in the morning, that coruſcations in the air were extremely frequent; and that a little before the earthquake, a large and black cloud ſuddenly covered the atmoſphere, which probably occaſioned the ſhock by the diſcharge of a ſhower.

A ſound was obſerved to roll from the Thames towards Temple Bar before the houſes ceaſed to nod, juſt as the electrical ſnap precedes the ſhock. This noiſe (which generally precedes earthquakes) the Doctor thought could be accounted for only on electrical principles: for, in a ſubterraneous eruption, the direct contrary would happen.

The flames and ſulphureous ſmells, which are ſometimes obſerved in earthquakes, might, he thought, be more eaſily accounted for, on the ſuppoſition of their being electrical phenomena, than from their being occaſioned by eruptions from the bowels of the earth.

So alſo the ſuddenneſs and expedition of the concuſſion, it being felt at the ſame inſtant over a ſurface of 4000 ſquare miles; and the little damage alſo which earthquakes generally occaſion; ſufficiently point out what ſort of a motion it is: not a convulſion of the bowels of the earth; but an uniform vibration along its ſurface, like that of a muſical ſtring or a glaſs when rubbed on the edge with one's finger.

The circumſtance of earthquakes chiefly affecting the ſea-coaſt, places along rivers, (and, adds Doctor Prieſtley, eminences) is a farther argument of their being electrical phenomena. This is illuſtrated by a particular account of the direction in which the earthquake was conveyed.

The laſt argument he uſes is taken from the effects which it had on perſons of weak conſtitutions, who were, for a day or two after it happened, troubled with pains in the back, rheumatiſms, hyſterics, and nervous diſorders; juſt in the ſame manner as they would have been after an actual electrification: to ſome theſe diſorders proved fatal.

As to the manner in which the earth and atmoſphere are put into this ſtate, which prepares them to receive ſuch a ſhock, and whence the electric matter comes, the Doctor does not pretend to determine; but thinks it as difficult to be accounted for, as magnetiſm, gravitation, and many other ſecrets of nature.

36 Hypotheſis of S. Beccaria.

The ſame hypotheſis was advanced by Signior Beccaria, without knowing any thing of Doctor Stukeley's diſcoveries. But this learned Italian imagined the electric matter which occaſions earthquakes, to be lodged deep in the bowels of the earth, agreeably to his hypotheſis concerning lightning.

Now, as it appears that the quantity of electric matter in the ſimpleſt thunder-ſtorms is ſo inconceivably great, that it is impoſſible to be contained by any cloud or number of clouds; and as, during the progreſs of a thunder-ſtorm which he obſerved, though the lightning frequently ſtruck to the earth, the ſame clouds were the next moment ready to make a ſtill greater diſcharge; it was evident, that they muſt have received at one place, the moment a diſcharge was made from them in another. Let us ſuppoſe theſe clouds ever ſo great, if the lightning proceeded only from them, the quantity muſt be leſſened by every diſcharge; and no recruits that any new clouds might bring can bear any proportion to the diſcharge which muſt enſue from the colliſion of ſo great a number as combine to form a thunder-ſtorm. It ſeems therefore moſt likely, that the electric matter is continually darting from the clouds in one place, at the ſame time that it is diſcharged from the earth in another; and, conſequently, that the clouds ſerve as conductors to convey the electric fluid from thoſe places of the earth which are overloaded with it, to thoſe which are exhauſted.

This theory being admitted, there will, he thinks, be little difficulty in attributing earthquakes to the ſame cauſe. For if the equilibrium of the electric matter be by any means loſt in the bowels of the earth; ſo that the beſt method of reſtoring it ſhall be by the fluid burſting into the air, and traverſing ſeveral miles of the atmoſphere, to come at the place where it is wanted; it may be eaſily imagined, that violent concuſſions will be given to the earth by the ſudden paſſage of ſo powerful an agent. This, in his opinion, was confirmed by the flaſhes of light, exactly reſembling lightning, which have been frequently ſeen to ruſh from the top of Mount Veſuvius, at the time that aſhes and other light matters have been carried out of it into the air, and diſperſed uniformly over a large tract of country. And it is well known, that volcanoes have a near connexion with earthquakes.

A rumbling noiſe like thunder, and flaſhes of light riſing from the ground, have been generally obſerved to attend earthquakes. And lightning itſelf has been known to be attended with ſmall ſhakings of the earth. So alſo *ignes fatui*, in mines, he looked upon as an argument that the electric fluid was ſometimes collected in the bowels of the earth.

37 Of Dr Prieſtley.

Dr Prieſtley, in his Hiſt. of Electricity, obſerves upon theſe theories, that a more probable hypotheſis may perhaps be formed out of both of them. "Suppoſe (ſays he) "the electric matter to be, ſome way or other, accumulated on one part of the ſurface of the earth, and, "on account of the dryneſs of the ſeaſon, not eaſily to "diffuſe itſelf; it may, as Signior Beccaria ſuppoſes, "force its way into the higher regions of the air, "forming clouds in its paſſage, out of the vapours "which float in the atmoſphere, and occaſion a ſudden "ſhower, which may further promote the paſſage of "the fluid. The whole ſurface, thus unloaded, will "receive a concuſſion, like any other conducting ſubſtance, on parting with, or receiving, a quantity of "the electric fluid. The ruſhing noiſe will likewiſe "ſweep over the whole extent of the country. And, "upon this ſuppoſition alſo, the fluid, in its diſcharge “from the country, will naturally follow the courſe of the rivers, and alſo take the advantage of any eminences to facilitate its aſcent into the higher regions of the air.”

The Doctor, making experiments with a battery on the paſſage of the electrical fluid over different conducting ſubſtances, and, among theſe, over water;—and remarking a reſemblance between its paſſage over the ſurface of the water, and that which Doctor Stukeley ſuppoſed to ſweep the ſurface of the earth, when a conſiderable quantity of it is diſcharged to the clouds during an earthquake; immediately ſuſpected that the water over which it paſſed, and which was viſibly thrown into a tremulous motion, muſt receive a concuſſion reſembling that which is given to the waves of the ſea on ſuch an occaſion.

To try this, he himſelf and others preſent put their hands into the water at the time that the electrical flaſh paſſed over its ſurface; and they felt a ſudden concuſſion given to them, exactly like that which is ſuppoſed to affect ſhips at ſea during an earthquake. This percuſſion was felt in various parts of the water, but was ſtrongeſt near the place where the exploſion was made. The ſame experiment, with a little variation, being afterwards made with a ſingle jar, at ſome diſtance below the ſurface of the water, produced the like effect, though in a weaker degree. “This ſimilarity in the effect,” the Doctor obſerves, “is a conſiderable evidence of a ſimilarity in the cauſe.”

“Pleaſed with this reſemblance of the earthquake, (ſays he) I endeavoured to imitate that great natural phenomenon in other reſpects: and, it being froſty weather, I took a plate of ice, and placed two ſticks, about three inches high, on their ends, ſo that they would juſt ſtand with eaſe; and upon another part of the ice, I placed a bottle, from the cork of which was ſuſpended a braſs ball with a fine thread. Then, making the electrical flaſh paſs over the ſurface of the ice, which it did with a very loud report, the nearer pillar fell down, while the more remote ſtood; and the ball, which had hung nearly ſtill, immediately began to make vibrations about an inch in length, and nearly in a right line from the place of the flaſh.”

“I afterwards diverſified this apparatus, erecting more pillars, and ſuſpending more pendulums, &c. ſometimes upon bladders ſtretched on the mouth of open veſſels, and at other times on wet boards ſwimming in a veſſel of water. This laſt method ſeemed to anſwer the beſt of any: for the board repreſenting the earth, and the water the ſea, the phenomena of them both during an earthquake may be imitated at the ſame time; pillars, &c. being erected on the board, and the electric flaſh being made to paſs either over the board, over the water, or over them both.”

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Deficiency of all theſe hypotheſes.

Theſe three hypotheſes concerning the cauſe of earthquakes, tho' ſomewhat differing from one another, yet agree in the main; but, if a particular ſolution of the phenomena is required, every one of them will be found deficient.

If, according to Dr Stukeley's hypotheſis, the electric matter is lodged only on the ſurface of the earth, or but at a ſmall depth below; how are we to account for thoſe violent effects which often take place in the bowels of the earth. In the earthquake at Liſbon, a large quay ſunk to an unfathomable depth. We are certain, that the cauſe of the earthquake muſt have been below this depth however great it was, and have opened the earth for an immenſe way downwards. At the ſame time an hill in Barbary clave aſunder, and the two halves of it fell different ways. This ſhews, that the cauſe of the earthquake operated not on the ſurface of the hill, but on the ſolid foundation and contents of it; nor can it be explained by any ſuperficial action whatever. From what the miners at Eyam bridge in Derbyſhire obſerved, it is alſo evident, that the ſhock was felt at the depth of 396 feet below the ſurface of the ground more than at the ſurface itſelf; and conſequently there is all the reaſon in the world to think that the cauſe lay at a depth vaſtly greater.

Again, tho' the earthquake at London was ſuppoſed to begin with a black cloud and ſhower; yet in that of 1755, the effects of which were incomparably greater, the air was calm and ſerene almoſt in every place where it was felt. It doth not appear that there is at any time a conſiderable difference between the electricity of the atmoſphere and that of the earth, or indeed that there can be ſo. For, if the earth is electrified *plus*, and the atmoſphere *minus*, there are innumerable points on the ſurface of the earth which muſt be imperceptibly drawing off the ſuperfluous electric matter into the air. The vapours alſo, with which the atmoſphere abounds, would always be ready in the ſame ſervice; and thus thunder and lightning might indeed ſometimes be produced, but not earthquakes. But laſtly, neither the air nor the earth does always ſhow any remarkable ſigns of electricity before earthquakes happen. For, the ſummer before the earthquake at Mancheſter in 1777, there had ſcarce been any thunder, lightning, or other ſigns of electricity in the atmoſphere, and vegetation had been extremely backward; and, according to the beſt accounts, the weather continued remarkably fine.

For theſe reaſons, Dr Stukeley's hypotheſis ſeems not to be ſatisfactory. That of Signior Beccaria is not indeed liable to the above-mentioned objections; but ſeems highly improbable, on another account. The atmoſphere is known to be a ſubſtance through which the electric matter makes its way with the utmoſt difficulty. It is a vaſtly worſe conductor than water, or than moiſt earth. If therefore the equilibrium of this fluid is loſt in the bowels of the earth, it is impoſſible to give a reaſon why it ſhould not rather go to the places where it is wanted through the earth itſelf, than through the atmoſphere. Beſides, if this was the caſe, the ſhock of an earthquake could only be felt at thoſe places where the electric fluid iſſued from the earth, and where it entered. All the intermediate places ought to be free from any ſhock, and to be ſenſible only of a violent concuſſion in the atmoſphere; but of this we have no example in any hiſtory of earthquakes whatever.

Dr Prieſtley's hypotheſis is liable to the ſame objections with that of Dr Stukeley; for any ſuperficial operation will never account for thoſe effects above mentioned, which take take at great depths below the ſurface. His experiment cannot be admitted as any way concluſive with regard to the cauſe of earthquakes, becauſe no quantity of electric fire is ſeen to paſs over the earth and ſea, like the flaſh attending the exploſion of an electric battery; and the force of his earthquake, (being but juſt able to throw down a ſtick that could hardly ſtand by itſelf) ſeems by far too little. The utmoſt force of electricity which man can raiſe, is indeed very trifling, when compared with the great operations of nature: but it is certain, that the force of an electric battery is by no means contemptible; and was its whole power to be employed in producing an imitation of an earthquake, it certainly would do much more than throw down a ſmall ſtick. The bad ſucceſs of this experiment therefore ſhows, that the Doctor's theory is erroneous: for, almoſt the whole of his electric power was ſpent another way; and we cannot ſuppoſe, that any conſiderable part of the force which produces earthquakes is ſpent any other way than in the very production of the earthquake itſelf.

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If it is attempted to give an explanation of the phenomena of earthquakes, which ſhall be free from the objections abovementioned, and from all others, it will be neceſſary, in the firſt place, to conſider thoſe parts of the ſyſtem of nature which ſeem to be moſt affected during the terrible phenomena we treat of. Theſe parts are, the air, the ſolid earth, and the water. Of theſe the two former are electrics *per ſe;* the latter is a conductor, though a bad one *. Hence it follows,

1. That in proportion to the quantity of earth which is mixed with any quantity of water, that mixture will approach nearer to the nature of an electric *per ſe*, and *vice verſa*.

2. It alſo follows, that whatever quantity of electricity is communicated to the ſolid earth, will be quickly taken off from it by the water which is mixed with it, in the ſame manner that the electric matter is carried off from an excited globe by a metallic conductor.

3. The whole earth is moiſt, and therefore in ſome degree a conductor. Nevertheleſs, as earth of all kinds, when perfectly dry, is found to be an electric capable of receiving a charge like glaſs, it is therefore poſſible, that the electric power of the earth may be excited to ſuch a degree, that the moiſture of the ſolid parts cannot eaſily contain the quantity of electricity communicated.

4. In this caſe, the earth muſt either give undoubted ſigns of its being excited in the ſame manner that other excited electrics do, or the electricity muſt be diſcharged ſomewhere elſe.

5. To receive any ſuperfluous quantity of electric matter that may be communicated to the ſolid earth, the waters of the ocean are always ready. Theſe, being a much better conductor than earth, muſt be a principal mean of preſerving the equilibrium of electricity in the different parts of the earth; and hence we ſee a natural reaſon why the waters of the ocean ſhould cover ſo large a proportion of the globe as they are known to do. See OCEAN.

6. It is known, that fire is alſo a conductor of electricity. Therefore, wherever a quantity of electric matter is collected in any part of the ſolid earth, if it can neither be conveniently received by the moiſture which the earth naturally contains, nor by the ocean in its neighbourhood, it will diſcharge itſelf by any volcano that happens to be in an active ſtate, near the place where that collection of electric matter is.

7. It is alſo found, that the electric fluid, being violently reſiſted by the ſuperincumbent atmoſphere, hath always a tendency to diſcharge itſelf in thoſe places where that reſiſtance is leaſt. The tops of very high mountains, therefore, where the weight of the atmoſphere is greatly diminiſhed, will alſo afford a ready paſſage for the electric fluid when it is collected in very great quantity in the bowels of the earth.

8. If, from ſome natural cauſes, the electric matter ſhall happen to be collected in the bowels of the earth in any particular place; and at the ſame time ſuch obſtacles are thrown in its way, that it can neither diſcharge itſelf into the ocean, nor into the atmoſphere, by the tops of high mountains, nor by the more open paſſages of volcanoes; the moſt terrible conſequences muſt enſue: the matter being pent up, and the cauſe by which it is collected continuing ſtill to act, its impulſe becomes at laſt irreſiſtible. It then flies againſt every obſtacle with inconceivable violence. It breaks out in all thoſe places where there is the leaſt reſiſtance, and therefore the ſhock is directed a great number of different ways at once. Houſes, ſteeples, trees, &c. by their height take off ſomewhat of the preſſure of the atmoſphere; and therefore the electric matter flies againſt them very violently. The houſes and other buildings being bad conductors, are thrown down; the trees affording a readier paſſage to the fluid are not hurt, though even they alſo are ſometimes ſplit. The height of the mountains renders them the objects of the deſtructive force of this fluid much more than any buildings whatever. Hence they are often rent, and rocks thrown down from them. The water contained in the ſolid parts of the earth, being a conductor of electricity, becomes overloaded with it; and, when it can receive no more, is forced to yield to the impulſe of the reſt, and therefore is thrown out of the earth in great quantities. For the ſame reaſon, the waters on the ſurface of the earth are moſt violently agitated. The ſmall quantities contained in wells are thrown out at the tops of them: The rivers and lakes, which contain too great a quantity of water to be thrown off from the earth, riſe in billows: The ocean itſelf, receiving more electric matter than can immediately be diſperſed through the whole body of water, or evaporate into the atmoſphere, retreats from the land, and is raiſed in vaſt mountains. The ſolid earth itſelf, being unable either to conduct the fluid quietly to thoſe parts where it is wanted, or to retain it, is violently ſhaken, or rent in multitudes of places; and this not only on the ſurface, but to great depths. The electricity being now in ſome meaſure diſcharged from the earth, the ocean ruſhes forward with fury to diſcharge in its turn the exceſs of electric matter it juſt before received from the earth. If there are volcanoes in the neighbourhood, the violent diſcharge of electricity is ſure to manifeſt itſelf by ſetting them in a flame; and thus, till the equilibrium is reſtored, all nature ſeems to be threatened with diſſolution.—Even in thoſe places where the force of the electric fluid is not able to ſhake the ſolid parts of the earth, it manifeſts its power by agitating the waters in the manner above deſcribed. Water being a much better conductor of electricity than earth, this ſubtile fluid, as ſoon as it can get out from the ſolid earth, flies to the water. The conſequence is, that the water immediately ſwells up, and

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and is attracted by whatever part of the earth has leſs electricity than itſelf. Hence thoſe ſtrange irregular motions of the waters in different places, ſo particularly obſerved at the time of the earthquake at Liſbon; and which it ſeems impoſſible to account for from any other cauſe than an immediate diſcharge of electric matter from the earth into them.

9. As it is impoſſible that any part of the earth can be electrified without communicating a proportionable ſhare of electricity to the animals that live upon it, and have a conſtant communication with it, it thence follows, that there can be no conſiderable commotion in the electric matter lodged in the bowels of the earth, without affecting that which is contained in the bodies of the animals. Hence the brutes, who ſeem to be more ſenſible of ſuch commotions than we, run about, and ſhew ſigns of fear, before the earthquake comes on; and hence the giddineſs, ſickneſs, &c. which the human race are ſubject to during the time of the ſhock, even though they do not feel it, as was the caſe at Gibraltar.

10. As the atmoſphere hath a communication with the earth, it is ſcarce to be ſuppoſed that the earth can, for any length of time, contain a conſiderable quantity of electric matter, without communicating to the atmoſphere a proportionable quantity. Before an earthquake, therefore, we muſt ſuppoſe the electricity of the earth and air to be in perfect equilibrio. Hence the weather is ſerene, there is no wind, nor any other ſign in the atmoſphere, of the terrible cataſtrophe that is about to enſue. But the moment the diſcharge is made from the earth, the equilibrium between the terreſtrial and atmoſpherical electricity is broken; the air either begins to receive the fluid from the earth, or the earth from the air. As there is not then time for the collection of thunder-clouds by which the electricity may be brought down in ſudden flaſhes of lightning, the fluid breaks through the ſubſtance of the air itſelf with diſmal and horrid noiſes, which always accompany an earthquake. That this is the caſe, ſeems highly probable from an experiment of M. de Romas, when, having brought down a vaſt quantity of electric matter from the clouds by means of a kite, he heard the noiſe it made in the air, like the continual blowing of a ſmall forge bellows. In general, there is a conſiderable change of weather takes place at the time of an earthquake, tho' not always. In the earthquake which happened in England in 1777, there was no remarkable change of weather there; but, ſoon after, there was a great deal of thunder and lightning in the ſouthern parts of Scotland: which ſeems to indicate, that the electric fluid diſcharged from the earth in England had taken its courſe northward, and produced the phenomena before mentioned in Scotland.

39
Ultimate cauſe of all the phenomena.

Having thus explained all the phenomena attending earthquakes, it remains only to ſhow by what means the equilibrium of electricity can be broken in the bowels of the earth in ſuch a manner as to produce theſe phenomena. The ultimate cauſe of this is mentioned under the article AURORA BOREALIS, n° 5. It is there ſhown, that the warmth of the ſun muſt neceſſarily bring down to the earth much greater quantities of electric matter in the regions within the tropics, than in the northern and ſouthern climates. It is impoſſible, as is there alſo obſerved, that there can be a perpetual accumulation of electricity in one part of the earth, unleſs there is a paſſage for it into the atmoſphere through ſome other. Hence, if the electric matter deſcends from the air into one place of the earth, it muſt neceſſarily aſcend from the earth into the air in ſome other place. There muſt be therefore a continual current of electricity through the bowels of the earth, beginning at the equator, and extending northward and ſouthward to both poles. While this current has a free paſſage from the earth in the northern and ſouthern regions, every thing goes on quietly; and whatever ſtorms may happen in the atmoſphere, the ſolid earth cannot be affected. Innumerable circumſtances, however, may tend to hinder this diſcharge, and conſequently to accumulate the electric matter in particular places. One very obvious cauſe of this kind, is an exceſſive froſt taking place in any part of the earth whence the electric matter was wont to be diſcharged. This renders the air itſelf ſo electric, that it cannot receive the fluid; at the ſame time that the water on the ſurface of the earth, being hard frozen, becomes electric alſo, and incapable of conducting. Very dry ſeaſons likewiſe contribute to produce the ſame effect; and thus the accumulation of electricity in the warmer climates becomes prodigiouſly great.

Earthquake.

It muſt here be obſerved, that, with regard to the operations of nature, we cannot always reaſon analogically from our electric experiments.—If a quantity of electricity is collected in any ſubſtance by artificial means, that quantity is taken off in a moment by the touch of any metallic ſubſtance, or other good conductor. As the whole earth, therefore, is filled with a conducting ſubſtance, namely water, it may very naturally be aſked, Why does not the ſuperfluous quantity of electric matter collected in one place, immediately diſperſe itſelf through all other parts of the earth by means of the water with which it abounds?—To obviate this difficulty, however, it needs only be remembered, that as the earth is quite full of electric matter all round, no quantity can enter any particular part, without being reſiſted by the reſt which is diffuſed through the whole globe. This reſiſtance will be proportioned to the facility with which it can eſcape at other places; and this it never can do, unleſs the earth is in a proper condition for emitting, and the atmoſphere for receiving, it. The preſſure, therefore, upon the accumulated quantity of electric matter ſoon becomes exceedingly great, and its diſpoſition to burſt out with violence is every day increaſed. At laſt, as the ſun ſtill continues to occaſion the deſcent of more and more of the electric fluid, that particular part of the earth becomes fully charged. The conſequence of this is, that the waters of fountains become foul; the electric matter being lodged in great quantity in the water, forces it into unuſual agitations, by which the earth is mixed with it. The ocean, for the ſame reaſon, is raiſed in huge billows, &c.; and theſe appearances prognoſticate the ſhock, in the ſame manner that ſlight flaſhes from the knob of an electrified bottle prognoſticate a diſcharge of all the electricity contained in it.

Beſides the earthquakes above deſcribed, whoſe cauſe ſeems to depend entirely on a collection of electric matter in the bowels of the earth, there are others frequently felt in the neighbourhood of volcanoes, which

Eaſel || Eaſter.

which are plainly owing to the efforts of the burning matter to diſcharge itſelf. Theſe, however, are but ſlight, and ſeldom extend to any conſiderable diſtance from the burning mountain. For a particular account of them, ſee the article VOLCANO.

EASEL PIECES, a denomination given by painters to ſuch pieces as are contained in frames, in contradiſtinction from thoſe painted on cielings, &c.

EASEMENT, in law, a privilege or convenience which one neighbour has of another, whether by charter or preſcription, without profit: ſuch are a way through his lands, a ſink, or the like. Theſe, in many caſes, may be claimed.

EASING, in the ſea-language, ſignifies the ſlackening a rope, or the like: thus, to eaſe the bow-line or ſheet, is to let them go ſlacker; to eaſe the helm, is to let the ſhip go more large, more before the wind, or more larboard.

EAST, one of the four cardinal points of the world; being that point of the horizon, where the ſun is ſeen to riſe when in the equinoctial.

EASTER, a feſtival of the Chriſtian church, obſerved in memory of our Saviour's reſurrection.

The Greeks call it *paſga*, the Latins *paſcha*, an Hebrew word ſignifying *paſſage*, applied to the Jewiſh feaſt of the paſſover. It is called *eaſter* in Engliſh, from the goddeſs Eoſtre, worſhipped by the Saxons with peculiar ceremonies in the month of April.

The Aſiatic churches kept their eaſter upon the very ſame day the Jews obſerved their paſſover; and others, on the firſt Sunday after the firſt full moon in the new year. This controverſy was determined in the council of Nice; when it was ordained, that eaſter ſhould be kept upon one and the ſame day, which ſhould always be a Sunday, in all Chriſtian churches in the world. For the method of finding eaſter by calculation, ſee ASTRONOMY, n° 308.

EASTER *Iſland*, an iſland in the South Sea, lying in N. Lat. 27. 5. W. Long. 109. 46. It is thought to have been firſt diſcovered in 1686 by one DAVIS an Engliſhman, who called it Davis's Land. It was next viſited by Commodore Roggewein, a Dutchman, in 1722; who gave it the name of *Eaſter Iſland*, and publiſhed many fabulous accounts concerning the country and its inhabitants. It was alſo viſited by a Spaniſh ſhip in 1770, the captain of which gave it the name of *St Carlos*. The only authentic accounts of this iſland, however, which have yet appeared, are thoſe publiſhed by Captain Cook and Mr Forſter, who viſited it in the month of March 1774.—According to theſe accounts, the iſland is about 10 or 12 leagues in circumference, and of a triangular figure; its greateſt length from north-weſt to ſouth-eaſt is about four leagues, and its greateſt breadth two. The hills are ſo high, that they may be ſeen at the diſtance of 15 or 16 leagues. The north and eaſt points of the iſland are of a conſiderable height; between them, on the ſouth-eaſt ſide, the ſhore forms an open bay, in which Captain Cook thinks the Dutch anchored in 1722. He himſelf anchored on the weſt ſide of the iſland, three miles northward from the ſouth point. This, he ſays, is a good road with eaſterly winds; but a dangerous one when the wind blows from the contrary quarter, as the other on the ſouth-eaſt ſide muſt be with eaſterly winds: ſo that there is no good accommodation to be had for ſhipping round the whole iſland.

Eaſter-Iſland.

The iſland itſelf is extremely barren; and bears evident marks not only of a volcanic origin, but of having been not very long ago entirely ruined by an eruption. As they approached the ſouth point, Mr Forſter informs us, that they obſerved the ſhore to riſe perpendicularly. It conſiſted of broken rocks, whoſe cavernous appearance, and black or ferruginous colour, ſeemed to indicate that they had been thrown up by ſubterraneous fire. Two detached rocks lie about a quarter of a mile off this point: one of them is ſingular on account of its ſhape, and repreſents a huge column or obeliſk; and both theſe rocks were inhabited by multitudes of ſea-fowls. On landing and walking into the country, they found the ground covered with rocks and ſtones of all ſizes, which appeared to have been expoſed to a great fire, where they ſeemed to have acquired a black colour and porous texture. Two or three ſhrivelled ſpecies of graſſes grew among theſe ſtones, and in ſome meaſure ſoftened the deſolate appearance of the country. The farther they advanced, the more ruinous the face of the country ſeemed to be. The roads were intolerably rugged, and filled with heaps of volcanic ſtones, among which the Europeans could not make their way but with the greateſt difficulty; but the natives leaped from one ſtone to another with ſurpriſing agility and eaſe. As they went northward along the iſland, they found the ground ſtill of the ſame nature; till at laſt they met with a large rock of black melted lava, which ſeemed to contain ſome iron, and on which was neither ſoil nor graſs, nor any mark of vegetation. Notwithſtanding this general barrenneſs, however, there are ſeveral large tracts covered with cultivated ſoil, which produces potatoes of a gold yellow colour, as ſweet as carrots, plantains, and ſugar-canes. The ſoil is a dry hard clay; and the inhabitants uſe the graſs which grows between the ſtones in other parts of the iſland as a manure, and for preſerving their vegetables when young, from the heat of the ſun.

The moſt remarkable curioſity belonging to this iſland is, a number of Coloſſian ſtatues; of which, however, very few remain entire. Theſe ſtatues are placed only on the ſea-coaſt. On the eaſt ſide of the iſland were ſeen the ruins of three platforms of ſtonework, on each of which had ſtood four of theſe large ſtatutes; but they were all fallen down from two of them, and one from the third: they were broken or defaced by the fall. Mr Wales meaſured one that had fallen, which was 15 feet in length, and ſix broad over the ſhoulders: each ſtatue had on its head a large cylindric ſtone of a red colour, wrought perfectly round. Others were found that meaſured near 27 feet, and upwards of eight feet over the ſhoulders; and a ſtill larger one was ſeen ſtanding, the ſhade of which was ſufficient to ſhelter all the party, conſiſting of near 30 perſons, from the rays of the ſun. The workmanſhip is rude, but not bad, nor are the features of the face ill formed; the ears are long, according to the diſtortion practiſed in the country, and the bodies have hardly any thing of a human figure about them. How theſe iſlanders, wholly unacquainted with any mechanical power, could raiſe ſuch ſtupendous figures, and afterwards place the large cylindric ſtones upon their heads, is truly wonderful! The moſt probable conjecture ſeems to be, that the ſtone is factitious; and that each figure was gradually erected, by forming a temporary platform round it, and raiſing it as the work advanced: but they are at any rate very ſtrong proofs of the ingenuity and perſeverance of the iſlanders in the age when they were built, as well as that the anceſtors of the preſent race had ſeen better days than their deſcendants enjoy. The water of this iſland is in general brackiſh, there being only one well that is perfectly freſh, which is at the eaſt end of the iſland: and whenever the natives repair to it to ſlake their thirſt, they waſh themſelves all over; and if there is a large company, the firſt leaps into the middle of the hole, drinks, and waſhes himſelf without ceremony; after which another takes his place, and ſo on in ſucceſſion. This cuſtom was much diſreliſhed by their new friends, who ſtood greatly in need of this valuable article, and did not wiſh to have it contaminated by ſuch ablutions.

The people are of a middle ſize. In general, they are rather thin; go entirely naked; and have punctures on their bodies, a cuſtom common to all the inhabitants of the South-Sea Iſlands, Their greateſt ſingularity is the ſize of their ears, the lobe of which is ſtretched out ſo that it almoſt reſts on their ſhoulder; and is pierced with a very large hole, capable of admitting four or five fingers with eaſe. The chief ornaments for their ears are the white down of feathers and rings which they wear in the inſide of the hole, made of the leaf of the ſugar-cane, which is very elaſtic, and for this purpoſe is rolled up like a watch-ſpring. Some were ſeen cloathed in the ſame cloth uſed in the iſland of Otaheite, tinged of a bright orange-colour with turmeric; and theſe our voyagers ſuppoſed to be chiefs. Their colour is a cheſnut-brown; their hair black, curling, and remarkably ſtrong; and that on the head as well as the face is cut ſhort. The women are ſmall, and ſlender-limbed: they have punctures on the face, reſembling the patches ſometimes uſed by European ladies; they paint their face all over with a reddiſh brown ruddle, and above this they lay a fine orange-colour extracted from turmeric-root; the whole is then variegated with ſtreaks of white ſhell-lime. But the moſt ſurpriſing circumſtance of all with regard to theſe people, is the apparent ſcarcity of women among them. The niceſt calculation that could be made, never brought the number of inhabitants in this iſland to above 700, and of theſe the females bore no proportion in number to the males. Either they have but few females; or elſe their women were reſtrained from appearing during the ſtay of the ſhip, notwithſtanding, the men ſhewed no ſigns of a jealous diſpoſition, or the women any ſcruples of appearing in public: in fact, they ſeemed to be neither reſerved nor chaſte; and the large pointed cap which they wore, gave them the appearance of profeſſed wantons: but as all the women who were ſeen were liberal of their favours, it is more than probable, that all the married and modeſt ones had concealed themſelves from their impetuous viſitants, in ſome inſcrutable parts of the iſland; and what further ſtrengthens this ſuppoſition is, that heaps of ſtones were ſeen piled up into little hillocks, which had one ſteep perpendicular ſide, where a hole went under ground. The ſpace within, ſays Mr Forſter, could be but ſmall; and yet it is probable, that theſe cavities ſerved, together with their miſerable huts, to give ſhelter to the people at night; and they may communicate with natural caverns, which are very common in the lava currents of volcanic countries. The few women that appeared, were the moſt laſcivious of their ſex that perhaps have been ever noticed in any country, and ſhame ſeemed to be entirely unknown to them.

EATON, a town of Buckinghamſhire, ſituated on the north ſide of the Thames, oppoſite to Windſor, and famous for its collegiate ſchool, founded by king Henry VI. being a ſeminary for king's college Cambridge, the fellows of which are all from this ſchool.

EAU de Carmes. See Pharmacy, n° 571.

Eau *de Luce*. See Chemistry, n° 335. and Pharmacy, n° 671.

EAVES, in architecture, the margin or edge of the roof of an houſe; being the loweſt tiles, ſlates, or the like, that hang over the walls, to throw off water to a diſtance from the wall.

Eaves-*Droppers*, are ſuch perſons as ſtand under the eaves, or walls, and windows of a houſe, by night or day, to hearken after news, and carry it to others, and thereby cauſe ſtrife and contention in the neighbourhood. They are called *evil members of the commonwealth*, by the ſtat. of Weſt. 1. c. 33. They may be puniſhed, either in the court-leet, by way of preſentment and fine; or in the quarter-ſeſſions, by indictment, and binding to good behaviour.

EBBING *of the* Tides. See Tide.

EBDOMARIUS, in eccleſiaſtical writers, an officer formerly appointed weekly to ſuperintend the performance of divine ſervice in cathedrals, and preſcribe the duties of each perſon attending in the choir, as to reading, ſinging, praying, &c.

EBENUS, the ebony-tree; a genus of the decandria order, belonging to the diadelphia claſs of plants. There is but one ſpecies, the cretica, a native of the iſland of Crete, and ſome others in the Archipelago. It riſes with a ſhrubby ſtalk three or four feet high; which puts out ſeveral ſide-branches garniſhed with hoary leaves at each joint, compoſed of five narrow ſpear-ſhaped lobes, which join at their tails to the footſtalk, and ſpread out like the fingers of a hand. The branches are terminated by thick ſpikes of large purple flowers, which are of the butterfly or pea-bloom kind. The plants may be propagated from ſeeds ſown in the autumn. In this country, the plants muſt be protected during the winter, as they are unable to bear the cold.

EBION, the author of the hereſy of the Ebionites, was a diſciple of Cerinthus, and his ſucceſſor. He improved upon the errors of his maſter, and added to them new opinions of his own. He began his preaching in Judea: he taught in Aſia, and even at Rome: his tenets infected the iſle of Cyprus. St John oppoſed both Cerinthus and Ebion in Aſia; and it is thought, that this apoſtle wrote his goſpel, in the year 97, particularly againſt this hereſy.

EBIONITES, in church hiſtory, heretics of the firſt century, ſo called from their leader Ebion. They, as well as the Nazarenes, had their origin from the circumciſed Chriſtians, who had retired from Jeruſalem to Pella during the war between the Jews and Romans; and made their firſt appearance, after the deſtruction of Jeruſalem, about the time of Domitian, or a little before.

They held the ſame errors with the Nazarenes, united the ceremonies of the Moſaic inſtitution with the precepts of the goſpel, obſerved both the Jewiſh ſabbath and Chriſtian Sunday, and in celebrating the euchariſt made uſe of unleavened bread. They abſtained from the fleſh of animals, and even from milk. In relation to Jeſus Chriſt, ſome of them held that he was born like other men, of Joſeph and Mary, and acquired ſanctification only by his good works. Others of them allowed, that he was born of a virgin; but denied that he was the Word of God, or had any exiſtence before his human generation. They ſaid, he was indeed the only true Prophet; but yet a mere man, who, by his virtue, had arrived at being called *Chriſt*, and *the Son of God*. They alſo ſuppoſed, that Chriſt and the devil were two principles, which God had oppoſed to each other. Of the New Teſtament they only received the goſpel of St Matthew, which they called the *goſpel according to the Hebrews*.

EBONY. See EBENUS.—This wood is exceedingly hard, heavy, and ſuſceptible of a very fine poliſh; on which account it is uſed in Moſaic and inlaid works, toys, &c. The beſt is of a jet black, free of veins and rind, very maſſive, aſtringent, and of a ſharp pungent taſte.

The cabinet-makers, inlayers, &c. make pear-tree and other woods paſs for ebony, by eboniſing, or giving it the black colour. This ſome do by a few waſhes of a hot decoction of galls, and when dry adding writing ink thereon, and poliſhing it with a ſtiff bruſh and a little hot wax. Others heat, or burn their wood black.

EBRO, anciently IBERUS, a large river of Spain, which, taking its riſe in Old Caſtile, runs thro' Biſcay and Arragon, paſſes by Saragoſa, and, continuing its courſe thro' Catalonia, diſcharges itſelf with great rapidity into the Mediterranean, about 20 miles below the city of Tortoſa.

EBULLITION, the ſame with BOILING. The word is alſo uſed in a ſynonymous ſenſe with EFFERVESCENCE.

ECCHELLENSIS (Abraham), a learned Maronite, whom the preſident le Jai employed in the edition of his Polyglott Bible. Gabriel Sionita, his countryman, drew him to Paris, in order to make him his fellow-labourer in publiſhing that bible. They fell out: Gabriel complained to the parliament, and cruelly defamed his aſſociate; their quarrel made a great noiſe. The congregation *de propaganda fide* aſſociated him, 1636, with thoſe whom they employed in making an Arabic tranſlation of the ſcripture. They recalled him from Paris, and he laboured in that tranſlation at Rome in the year 1652. While he was profeſſor of the Oriental languages at Rome, he was pitched upon by the great duke Ferdinand II. to tranſlate from Arabic into Latin the 5th, 6th, and 7th books of Apollonius's Conics; in which he was aſſiſted by John Alphonſo Borelli, who added commentaries to them. He died at Rome in 1664.

ECCHYMOSIS, from εκχυω, to *pour out*, or from ἐξ, *out of*, and χυμος, *juice*. It is an effuſion of humours from their reſpective veſſels, under the integuments; or, as Paulus Ægineta ſays, "When the fleſh is bruiſed by the violent colliſion of any object, and its ſmall veins broken, the blood is gradually diſcharged from them." This blood, when collected under the ſkin, is called an *ecchymoſis*, the ſkin in the mean time remaining entire; ſometimes a tumour is formed by it, which is ſoft and livid, and generally without pain. If the quantity of blood is not conſiderable, it is uſually reſorbed; if much, it ſuppurates: it rarely happens that any further inconvenience follows; though, in caſe of a very bad habit of body, a mortification may be the reſult, and in ſuch a caſe regard muſt be had thereto.

ECCLAIRCISSEMENT. See ESCLAIRCISSEMENT.

ECCLESIASTES, a canonical book of the Old Teſtament, the deſign of which is to ſhew the vanity of all ſublunary things.

It was compoſed by Solomon; who enumerates the ſeveral objects on which men place their happineſs, and then ſhews the inſufficiency of all worldly enjoyments.

The Talmudiſts make king Hezekiah to be the author of it; Grotius aſcribes it to Zorobabel, and others to Iſaiah; but the generality of commentators believe this book to be the produce of Solomon's repentance, after having experienced all the follies and pleaſures of life.

ECCLESIASTICAL, an appellation given to whatever belongs to the church: thus we ſay, eccleſiaſtical polity, juriſdiction, hiſtory, &c.

ECCLESIASTICAL *Courts*. In the time of the Anglo-Saxons there was no ſort of diſtinction between the lay and the eccleſiaſtical juriſdiction: the county-court was as much a ſpiritual as a temporal tribunal: the rights of the church were aſcertained and aſſerted at the ſame time, and by the ſame judges, as the rights of the laity. For this purpoſe the biſhop of the dioceſe, and the alderman, or in his abſence the ſheriff of the county, uſed to ſit together in the county-court, and had there the cognizance of all cauſes as well eccleſiaſtical as civil; a ſuperior deference being paid to the biſhop's opinion in ſpiritual matters, and to that of the lay-judges in temporal. This union of power was very advantageous to them both: the preſence of the biſhop added weight and reverence to the ſheriff's proceedings; and the authority of the ſheriff was equally uſeful to the biſhop, by enforcing obedience to his decrees in ſuch refractory offenders as would otherwiſe have deſpiſed the thunder of mere eccleſiaſtical cenſures.

Blackſt. Comment.

But ſo moderate and rational a plan was wholly inconſiſtent with thoſe views of ambition that were then forming by the court of Rome. It ſoon became an eſtabliſhed maxim in the papal ſyſtem of policy, that all eccleſiaſtical perſons and all eccleſiaſtical cauſes ſhould be ſolely and entirely ſubject to eccleſiaſtical juriſdiction only: which juriſdiction was ſuppoſed to be lodged in the firſt place and immediately in the Pope, by divine indefeaſible right and inveſtiture from Chriſt himſelf, and derived from the Pope to all inferior tribunals. Hence the canon law lays it down as a rule, that "*ſacerdotes a regibus honorandi ſunt, non judicandi*; and places an emphatical reliance on a fabulous tale which it tells of the emperor Conſtantine, That when ſome petitions were brought to him, imploring the aid of his authority againſt certain of his biſhops accuſed of oppreſſion and injuſtice, he cauſed (ſays the holy canon) the petitions to be burnt in their preſence, diſmiſſing them with this valediction; "*Ite, et inter vos cauſas* "*veſtras diſcutite, quia dignum non eſt ut nos judicemus* "*Deos.*"

It was not, however, till after the Norman conqueſt, that this doctrine was received in England; when William I. (whoſe title was warmly eſpouſed by the monaſteries which he liberally endowed, and by the foreign clergy, whom he brought over in ſhoals from France and Italy, and planted in the beſt preferments of the Engliſh church), was at length prevailed upon to eſtabliſh this fatal encroachment, and ſeparate the eccleſiaſtical court from the civil: whether actuated by principles of bigotry, or by thoſe of a more refined policy, in order to diſcountenance the laws of king Edward abounding with the ſpirit of Saxon liberty, is not altogether certain. But the latter, if not the cauſe, was undoubtedly the conſequence, of this ſeparation: for the Saxon laws were ſoon overborne by the Norman juſticiaries, when the county-court fell into diſregard by the biſhop's withdrawing his preſence, in obedience to the charter of the conqueror; which prohibited any ſpiritual cauſe from being tried in the ſecular courts, and commanded the ſuitors to appear before the biſhop only, whoſe deciſions were directed to conform to the canon law.

King Henry the firſt, at his acceſſion, among other reſtorations of the laws of king Edward the Confeſſor, revived this of the union of the civil and eccleſiaſtical courts. Which was, according to Sir Edward Coke, after the great heat of the conqueſt was paſt, only a reſtitution of the ancient law of England. This however was ill reliſhed by the Popiſh clergy, who, under the guidance of that arrogant prelate archbiſhop Anſelm, very early diſapproved of a meaſure that put them on a level with the profane laity, and ſubjected ſpiritual men and cauſes to the inſpection of the ſecular magiſtrates: and therefore, in their ſynod at Weſtminſter, 3 Hen. I. they ordained, that no biſhop ſhould attend the diſcuſſion of temporal cauſes; which ſoon diſſolved this newly effected union. And when, upon the death of king Henry the firſt, the uſurper Stephen was brought in and ſupported by the clergy, we find one article of the oath which they impoſed upon him was, that eccleſiaſtical perſons and eccleſiaſtical cauſes ſhould be ſubject only to the biſhop's juriſdiction. And as it was about that time that the conteſt and emulation began between the laws of England and thoſe of Rome, the temporal courts adhering to the former, and the ſpiritual adopting the latter, as their rule of proceeding; this widened the breach between them, and made a coalition afterwards impracticable; which probably would elſe have been effected at the general reformation of the church.

Eccleſiaſtical Courts are various; as the ARCHDEACON'S, the CONSISTORY, the Court of ARCHES, the PECULIARS, the PREROGATIVE, and the great court of appeal in all eccleſiaſtical cauſes, viz. the Court of DELEGATES. See theſe articles.

Blackſt. Comment.

As to the method of proceeding in the ſpiritual courts, it muſt (in the firſt place) be acknowledged to their honour, that though they continue to this day to decide many queſtions which are properly of temporal cognizance, yet juſtice is in general ſo ably and impartially adminiſtered in thoſe tribunals, (eſpecially of the ſuperior kind,) and the boundaries of their power are now ſo well known and eſtabliſhed, that no material inconvenience at preſent ariſes from this juriſdiction ſtill continuing in the ancient channel. And, ſhould any alteration be attempted, great confuſion would probably ariſe, in overturning long eſtabliſhed forms, and new-modelling a courſe of proceedings that has now prevailed for ſeven centuries.

The eſtabliſhment of the civil-law proceſs in all the eccleſiaſtical courts was indeed a maſterpiece of papal diſcernment, as it made a coalition impracticable between them and the national tribunals, without manifeſt inconvenience and hazard. And this conſideration had undoubtedly its weight in cauſing this meaſure to be adopted, though many other cauſes concurred. In particular, it may be here remarked, that the pandects, or collections of civil law, being written in the Latin tongue, and referring ſo much to the will of the prince and his delegated officers of juſtice, ſufficiently recommended them to the court of Rome, excluſive of their intrinſic merit. To keep the laity in the darkeſt ignorance, and to monopolize the little ſcience which then exiſted entirely among the monkiſh clergy, were deep-rooted principles of papal policy. And, as the biſhops of Rome affected in all points to mimic the imperial grandeur, as the ſpiritual prerogatives were moulded on the pattern of the temporal, ſo the canon-law proceſs was formed on the model of the civil law; the prelates embracing, with the utmoſt ardor, a method of judicial proceedings, which was carried on in a language unknown to the bulk of the people, which baniſhed the intervention of a jury (that bulwark of Gothic liberty), and which placed an arbitrary power of deciſion in the breaſt of a ſingle man.

The proceedings in the eccleſiaſtical courts are therefore regulated according to the practice of the civil and canon laws; or rather to a mixture of both, corrected and new-modelled by their own particular uſages, and the interpoſition of the courts of common law. For, if the proceedings in the ſpiritual court be ever ſo regularly conſonant to the rules of the Roman law, yet if they be manifeſtly repugnant to the fundamental maxims of the municipal laws, to which, upon principles of ſound policy, the eccleſiaſtical proceſs ought in every ſtate to conform; (as if they require two witneſſes to prove a fact, where one will ſuffice at common law); in ſuch caſes, a prohibition will be awarded againſt them. But, under theſe reſtrictions, their ordinary courſe of proceeding is, firſt, by *citation*, to call the party injuring before them. Then by *libel*, (*libellus*, a little book,) or by articles drawn out in a formal *allegation*, to ſet forth the complainant's ground of complaint. To this ſucceeds the *defendant's anſwer* upon oath; when, if he denies or extenuates the charge, they proceed to *proofs* by witneſſes examined, and their depoſitions taken down in writing by an officer of the court. If the defendant has any circumſtances to offer in his defence, he muſt alſo propound them in what is called his *defenſive allegation*, to which he is entitled in his turn to the *plaintiff's anſwer* upon oath, and may from thence proceed to *proofs* as well as his antagoniſt. The canonical doctrine of *purgation*, whereby the parties were obliged to anſwer upon oath to any matter, however criminal, that might be objected againſt them, (though long ago over-ruled in the court of chancery, the genius of the Engliſh law having broken through the bondage impoſed on it by its clerical chancellors, and aſſerted the doctrines of judicial as well as civil liberty) continued till the middle of the laſt century, to be upheld by the ſpiritual courts; when the legiſlature was obliged to interpoſe, to teach them a leſſon of ſimilar moderation. By the ſtatute of 13 Car. II. c. 12. it is enacted, that it ſhall not be lawful for any biſhop, or eccleſiaſtical judge, to tender or adminiſter to any perſon whatſoever, the oath uſually called the oath *ex officio*, or any other oath whereby he may be compelled to confeſs, accuſe, or purge himſelf of any criminal matter or thing, whereby he may be liable to any cenſure or puniſhment. When all the pleadings and proofs are concluded, they are referred to the conſideration, not of a jury, but of a ſingle judge; who *takes information* by hearing advocates on both ſides, and thereupon forms his *interlocutory decree* or *definitive ſentence*, at his own diſcretion: from which there generally lies an *appeal*, in the ſeveral ſtages mentioned in the articles above referred to; tho' if the ſame be not appealed from him in 15 days, it is final, by the ſtatute 25 Hen. VIII. c. 19.

But the point in which theſe juriſdictions are the moſt defective, is that of enforcing their ſentences when pronounced; for which they have no other proceſs, but that of *excommunication;* which would be often deſpiſed by obſtinate or profligate men, did not the civil law ſtep in with its aid. See EXCOMMUNICATION.

ECCLESIASTICAL *Corporations*, are where the members that compoſe them are *ſpiritual* perſons. They were erected for the furtherance of religion and perpetuating the rights of the church. See CORPORATIONS.

ECCLESIASTICAL *State*. See CLERGY.

ECCLESIASTICUS, an apocryphal book, generally bound up with the ſcriptures, ſo called, from its being read in the church, *eccleſia*, as a book of piety and inſtruction, but not of infallible authority.

The author of this book was a Jew, called *Jeſus the ſon of Sirach*. The Greeks call it the *Wiſdom of the ſon of Sirach*.

ECCOPROTICS, in pharmacy. See CATHARTICS, and EVACUANTS.

ECHAPE, in the menage, a horſe begot between a ſtallion and a mare of different breeds and countries.

ECHAPER, in the menage, a galliciſm uſed in the academies, implying to give a horſe head, or to put on at full ſpeed.

ECHENEIS, in ichthyology, a genus belonging to the order of thoracici. The head is fat, naked, depreſſed, and marked with a number of tranſverſe ridges; it has ten rays in the branchioſtege membrane; and the body is naked. There are two ſpecies, viz. 1. The remora, or ſucking-fiſh, with a forked tail, and 18 ſtriæ on the head. It is found in the Indian ocean. 2. The neucrates, with an undivided tail, and 24 ſtriæ on the head. It is likewiſe a native of the Indian ocean. See Plate CII.

ECHEVIN, in the French and Dutch polity, a magiſtrate elected by the inhabitants of a city or town, to take care of their common concerns, and the decoration and cleanlineſs of the city.

At Paris, there is a prevôt, and four echevins; in other towns, a mayor and echevins. At Amſterdam, there are nine echevins; and, at Rotterdam, ſeven.

In France, the echevins take cognizance of rents, taxes, and the navigation of rivers, &c. In Holland, they judge of civil and criminal cauſes; and if the criminal confeſſes himſelf guilty, they can ſee their ſentence executed without appeal.

ECHINATE, or ECHINATED, an appellation given to whatever is prickly, thereby reſembling the hedgehog.

ECHINITES, in natural hiſtory, the name by which authors call the foſſile centronia, frequently found in our chalk-pits. See CENTRONIA.

ECHINI MARINI. See ECHINUS.

ECHINUS, in zoology, a genus of inſects belonging to the order of vermes molluſca. The body is roundiſh, covered with a bony cruſt, and often beſet with moveable prickles; and the mouth is below, and conſiſts of five valves. 1. The ſpecimen on Plate CI. is the eſculentus, or eatable echinus. It is of a hemiſpherical form, covered with ſharp ſtrong ſpines, above half an inch long; commonly of a violet colour; moveable; adherent to ſmall tubercles elegantly diſpoſed in rows. Theſe are their inſtruments of motion by which they change their place. This ſpecies is taken in dredging, and often lodges in cavities of rocks juſt within low water mark. They are eaten by the poor in many parts of England, and by the better ſort abroad. In old times they were a favourite diſh. They were dreſſed with vinegar, honied wine or mead, parſley or mint; and thought to agree with the ſtomach. They were the firſt diſh in the famous ſupper of Lentulus, when he was made *flamen Martialis*, or prieſt of Mars. By ſome of the concomitant diſhes, they ſeem deſigned as a whet for the ſecond courſe, to the holy perſonages, prieſts and veſtals invited on that occaſion. Many ſpecies of ſhell-fiſh made part of that entertainment. 2. The lacunoſus, or oval echinus, is of an oval depreſſed form; on the top it is of a purple colour, marked with a quadrefoil, and the ſpaces between tuberculated in waved rows; the lower ſide ſtudded, and divided by two ſmooth ſpaces. Length, four inches. When clothed, it is covered with ſhort thickſet briſtles mixed with very long ones.—There are 15 other ſpecies, all natives of the ſea.

ECHINUS, in architecture, a member or ornament near the bottom of the Ionic, Corinthian, and Compoſite capitals.

ECHIUM, VIPER'S BUGLOSS; a genus of the monogynia order, belonging to the pentandria claſs of plants. There are ſeven ſpecies, three of which are natives of Britain. None of them have any remarkable property, except that the flowers of one ſpecies (the vulgare) are very grateful to bees. It is a native of many parts of Britain. The ſtem is rough with hairs and tubercles. The leaves are ſpear-ſhaped, and rough with hair. The flowers come out in lateral ſpikes. They are firſt red, afterwards blue; ſometimes purple or white.—Cows and ſheep are not fond of the plant; horſes and goats refuſe it.

ECHO, or ECCHO, a ſound reflected or reverberated, from a ſolid, concave, body, and ſo repeated to the ear *. The word is formed from the Greek ἦχος, *ſound*, which comes from the verb ἠχεω, *ſono*.

The ancients being wholly unacquainted with the true cauſe of the echo, aſcribed it to ſeveral cauſes ſufficiently whimſical. The poets, who were not the

* See *Acouſtics*, nº 27.

Echo.

worſt of their philoſophers, imagined it to be a perſon of that name metamorphoſed, and that ſhe affected to take up her abode in particular places; for they found by experience, that ſhe was not to be met with in all. (See below, Echo in *fabulous hiſtory.*) But the moderns, who know ſound to conſiſt in a certain tremor or vibration in the ſonorous body communicated to the contiguous air, and by that means to the ear, give a more conſiſtent account of echo.

For a tremulous body, ſtriking on another ſolid body, it is evident, may be repelled without deſtroying or diminiſhing its tremor; and conſequently a ſound may be redoubled by the reſilition of the tremulous body, or air.

But a ſimple reflexion of the ſonorous air, is not enough to ſolve the echo: for then every plain ſurface of a ſolid hard body, as being fit to reflect a voice or ſound, would redouble it; which we find does not hold.

To produce an echo, therefore, it ſhould ſeem that a kind of concameration or vaulting were neceſſary, in order to collect, and by collecting to heighten and increaſe, and afterwards reflect, the ſound; as we find is the caſe in reflecting the rays of light, where a concave mirror is required.

In effect, as often as a ſound ſtrikes perpendicularly on a wall, behind which is any thing of a vault or arch, or even another parallel wall; ſo often will it be reverberated in the ſame line, or other adjacent ones.

For an echo to be heard, therefore, it is neceſſary the ear be in the line of reflection: for the perſon who made the ſound to hear its echo, it is neceſſary he be perpendicular to the place which reflects it: and for a manifold or tautological echo, it is neceſſary there be a number of walls, and vaults or cavities, either placed behind or fronting each other.

A ſingle arch or concavity, &c. can ſcarce ever ſtop and reflect all the ſound; but if there be a convenient diſpoſition behind it, part of the ſound propagated thither, being collected and reflected as before, will preſent another echo: or, if there be another concavity, oppoſed at a due diſtance to the former, the ſound reflected from the one upon the other will be toſſed back again by this latter, &c.

Many of the phenomena of echos, are well conſidered by the biſhop of Leighs, &c. who remarks, that any ſound, falling either directly or obliquely on any denſe body of a ſmooth, whether plain or arched, ſuperficies, is reflected, or echoes, more or leſs. The ſurface, ſays he, muſt be ſmooth; otherwiſe the air, by reverberation, will be put out of its regular motion, and the ſound thereby broken and extinguiſhed. He adds, that it echoes more or leſs, to ſhow, that when all things are as before deſcribed, there is ſtill an echoing, tho' it be not always heard; either becauſe the direct ſound is too weak to beat quite back again to him that made it; or that it does return to him, but ſo weak, that it cannot be diſcerned; or that he ſtands in a wrong place to receive the reflected ſound, which paſſes over his head, under his feet, or on one ſide of him; and which therefore may be heard by a man ſtanding in the place where the reflected ſound does come, provided no interpoſed body intercepts it, but not by him that firſt made it.

Echoes may be produced with different circumſtances. For, 1. A *plane* obſtacle reflects the ſound back in its due tone and loudneſs; allowance being made for the proportionable decreaſe of the ſound, according to its diſtance.

2. A *convex* obſtacle reflects the ſound ſomewhat ſmaller and ſomewhat quicker, though weaker, than otherwiſe it would be.

3. A *concave* obſtacle echoes back the ſound, bigger, ſlower, and alſo inverted; but never according to the order of words.

Nor does it ſeem poſſible to contrive any ſingle echo, that ſhall invert the ſound, and repeat backwards; becauſe, in ſuch caſe, the word laſt ſpoken, that is, which laſt occurs to the obſtacle, muſt be repelled firſt; which cannot be. For where in the mean time ſhould the firſt words hang and be concealed; or how, after ſuch a pauſe, be revived, and animated again into motion?

From the determinate concavity or archedneſs of the reflecting bodies, it may happen that ſome of them ſhall only echo back one determinate note, and only from one place.

4. The echoing body being removed farther off, it reflects more of the ſound than when nearer; which is the reaſon why ſome echoes repeat but one ſyllable, ſome one word, and ſome many.

5. Echoing bodies may be ſo contrived and placed, as that reflecting the ſound from one to the other, either directly and mutually, or obliquely and by ſucceſſion, out of one ſound, a multiple echo or many echoes ſhall ariſe.

Add, that a multiple echo may be made, by ſo placing the echoing bodies at unequal diſtances, that they may reflect all one way, and not one on the other; by which means, a manifold ſucceſſive ſound will be heard: one clap of the hands, like many; on *ha*, like a laughter; one ſingle word, like many of the ſame tone and accent; and ſo one viol, like many of the ſame kind, imitating each other.

Laſtly, echoing bodies may be ſo ordered, that, from any one ſound given, they ſhall produce many echoes different both as to tone and intention. By which means a muſical room may be ſo contrived, that not only one inſtrument playing therein, ſhall ſeem many of the ſame ſort and ſize, but even a concert of different ones, only by placing certain echoing bodies ſo, that any note played, ſhall be returned by them in 3ds, 5ths, and 8ths.

Echo, is alſo uſed for the place where the repetition of the ſound is produced or heard.

Echoes are diſtinguiſhed into divers kinds, *viz.*

1. *Single*, which return the voice but once. Whereof ſome are *tonical*, which only return a voice when modulated into ſome particular muſical tone: Others, *polyſyllabical*, which return many ſyllables, words, and ſentences. Of this laſt kind is that fine echo in Woodſtock-park, which Doctor Plot aſſures us, in the daytime, will return very diſtinctly ſeventeen ſyllables, and in the night twenty.

2. *Multiple*, or *tautological*; which return ſyllables and words the ſame oftentimes repeated.

In echoes, the place where the ſpeaker ſtands is called the *centrum phonicum*; and the object or place that returns the voice, the *centrum phonocampticum*.

At the ſepulchre of Metella, wife of Craſſus, was an echo, which repeated what a man ſaid, five times.

Authors mention a tower at Cyzicus, where the echo repeated ſeven times. One of the fineſt echoes we read of is that mentioned by Barthius, in his notes on Statius's *Thebais*, lib. vi. 30. which repeated the words a man uttered 17 times: it was on the banks of the Naha, between Coblentz and Bingen. Barthius aſſures us, he had proved what he writes; and had told 17 repetitions. And whereas, in common echoes, the repetition is not heard till ſome time after hearing the word ſpoke, or the notes ſung; in this, the perſon who ſpeaks, or ſings, is ſcarce heard at all; but the repetition moſt clearly, and always in ſurpriſing varieties; the echo ſeeming ſometimes to approach nearer, and ſometimes to be further off. Sometimes the voice is heard very diſtinctly, and ſometimes ſcarce at all. One hears only one voice, and another ſeveral: one hears the echo on the right, and the other on the left, &c. At Milan in Italy, is an echo which reiterates the report of a piſtol 56 times; and if the report is very loud, upwards of 60 reiterations may be counted. The firſt 20 echoes are pretty diſtinct; but as the noiſe ſeems to fly away, and anſwer at a greater diſtance, the reiterations are ſo doubled, that they can ſcarce be counted.

Echo, in architecture, a term applied to certain kinds of vaults and arches, moſt commonly of the elliptic and parabolic figures, uſed to redouble ſounds, and produce artificial echoes.

Echo, in poetry, a kind of compoſition wherein the laſt words or ſyllables of each verſe contain ſome meaning, which, being repeated apart, anſwers to ſome queſtion or other matter contained in the verſe; as in this beautiful one from Virgil:

Crudelis mater magis, an puer improbus ille?
Improbus ille puer, crudelis tu quoque mater.

The elegance of an echo conſiſts in giving a new ſenſe to the laſt words; which reverberate, as it were, the motions of the mind, and by that means affect it with ſurpriſe and admiration.

Echo, in fabulous hiſtory, a nymph in love with Narciſſus; but being deſpiſed by him, pined herſelf to death, having nothing but her voice left.

ECHOMETER, among muſicians, a kind of ſcale or rule, with ſeveral lines thereon, ſerving to meaſure the duration and length of ſounds, and to find their intervals and ratios.

ECKIUS (John), an eminent and learned divine, profeſſor in the univerſity of Ingoldſtadt, memorable for the oppoſition he gave to Luther, Melancthon, Caraloſtadius, and other leading Proteſtants in Germany. He wrote many polemical tracts; and among the reſt, a *Manual of Controverſies*, printed in 1535, in which he diſcourſes upon moſt of the heads conteſted between the Proteſtants and Papiſts. He was a man of uncommon learning, parts, and zeal, and died in 1543.

ECLECTICS, ancient philoſophers, who, without attaching themſelves to any particular ſect, ſelected whatever appeared to them the beſt and moſt rational, from each.

Potamon of Alexandria was the firſt of the eclectics: he lived in the reigns of Auguſtus and Tiberius; and being tired with the ſcepticiſm of the Pyrrhonians, he reſolved upon a ſcheme that would allow him to believe ſomething, but without being ſo implicit as to ſwallow any entire hypotheſis.

ECLIPSE, in aſtronomy, the deprivation of the light of the ſun, or of ſome heavenly body, by the interpoſition of another heavenly body between our ſight and it. See Astronomy, n° 227.

ECLIPTIC, in aſtronomy, a great circle of the ſphere, ſuppoſed to be drawn through the middle of the zodiac, making an angle with the equinoctial of about 23° 30′, which is the ſun's greateſt declination; or, more ſtrictly ſpeaking, it is that path or way among the fixed ſtars, that the earth appears to deſcribe to an eye placed in the ſun. See Astronomy.

Some call it *via Solis*, "the way of the ſun;" becauſe the ſun in his apparent annual motion never deviates from it, as all the other planets do more or leſs. It is called *ecliptic*, by reaſon all eclipſes happen when the planets are in, or near, its Node.

Ecliptic, in geography, a great circle on the terreſtrial globe, not only anſwering to, but falling within, the plane of the celeſtial ecliptic. See Geography.

ECLOGUE, in poetry, a kind of paſtoral compoſition, wherein ſhepherds are introduced converſing together.

The word is formed from the Greek εκλογη, *choice*; ſo that, according to the etymology, *eclogue* ſhould be no more than a ſelect or choice piece; but cuſtom has determined it to a farther ſignification, *viz.* a little elegant compoſition in a ſimple, natural ſtyle and manner.

Idyllion and eclogue, in their primary intention, are the ſame thing: thus, the idyllia, ειδυλλια, of Theocritus, are pieces wrote perfectly in the ſame vein with the *eclogæ* of Virgil. But cuſtom has made a difference between them, and appropriated the name *eclogue*, to pieces wherein ſhepherds are introduced ſpeaking; *idyllion*, to thoſe wrote like the eclogue, in a ſimple natural ſtyle, but without any ſhepherds in them.

ECLUSE, a ſmall but ſtrong town of the Dutch Low Countries, in the county of Flanders, with a good harbour and ſluices. The Engliſh beſieged it in vain in 1405, and the people of Bruges in 1436. But the Dutch, commanded by Count Maurice of Naſſau, took it in 1644. It is defended by ſeveral forts, and ſtands near the ſea. E. Long. 3. 10. N. Lat. 50. 25.

ECPHRACTICS, in medicine, remedies which attenuate and remove obſtructions. See Attenuants, and Deobstruents.

ECTHESIS, in church-hiſtory, a confeſſion of faith, in the form of an edict, publiſhed in the year 639, by the emperor Heraclius, with a view to pacify the troubles occaſioned by the Eutychian hereſy in the eaſtern church. However, the ſame prince revoked it, on being informed that pope Severinus had condemned it, as favouring the Monothelites; declaring at the ſame time, that Sergius, patriarch of Conſtantinople, was the author of it.

ECTHLIPSIS, among Latin grammarians, a figure of proſody whereby the *m* at the end of a word, when the following word begins with a vowel, is elided, or cut off, together with the vowel preceding it, for the ſake of the meaſure of the verſe: thus they read *mult' ille*, for *multum ille*.

ECTROPIUM, in ſurgery, is when the eye-lids are inverted, or retracted, ſo that they ſhew their internal or red ſurface, and cannot ſufficiently cover the eye.

ECTYLOTICS, in pharmacy, remedies proper for conſuming calloſities.

ECU, or ESCU, a French crown; for the value of which, ſee MONEY.

EDDISH, or EADISH, the latter paſture, or graſs that comes after mowing or reaping; otherwiſe called *eagraſs*, or *earſh*, and *etch*.

EDDOES, or EDDERS, in botany; the American name of the ARUM peregrinum.

EDDY TIDE, or EDDY WATER, among ſeamen, is where the water runs back contrary to the tide; or that which hinders the free paſſage of the ſtream, and ſo cauſes it to return again.

EDDY-*Wind* is that which returns or is beat back from a ſail, mountain, or any thing that may hinder its paſſage.

EDELINCK (Gerard), a famous engraver, born at Antwerp, where he was inſtructed in drawing and engraving. He ſettled at Paris, in the reign of Lewis XIV. who made him his engraver in ordinary. Edelinck was alſo counſellor in the Royal Academy of Painting. His print of the Holy Family, copied from Raphael, thoſe of Alexander viſiting the family of Darius, and the Penitent Magdalen, from le Brun, are particularly admired. His works are particularly eſteemed for the neatneſs of the engraving, the brilliant caſt, and the prodigious eaſe apparent in the execution; and to this facility is owing the great number of plates we have of his, among which are excellent portraits of a great number of illuſtrious men of his time. He died in 1707, in an advanced age, at the Hotel Royal at the Gobelins, where he had an apartment. He had a brother named John, who was a ſkilful engraver, but died young.

EDGINGS, in gardening, the ſeries of ſmall but durable plants, ſet round the edges or borders of flower-beds, &c. The beſt and moſt durable of all plants for this uſe, is box; which, if well planted, and rightly managed, will continue in ſtrength and beauty for many years. The ſeaſons for planting this, are the autumn, and very early in the ſpring: and the beſt ſpecies for this purpoſe is the dwarf Dutch box.

Formerly, it was alſo a very common practice to plant borders, or edgings, of aromatic herbs; as thyme, ſavory, hyſſop, lavender, and the like: but theſe are all apt to grow woody, and to be in part, or wholly, deſtroyed in hard winters. Daiſies, thrift, or ſea july-flower, and chamomile, are alſo uſed by ſome for this purpoſe: but they require yearly tranſplanting, and a great deal of trouble, elſe they grow out of form; and they are alſo ſubject to periſh in very hard ſeaſons.

EDICT, in matters of polity, an order or inſtrument, ſigned and ſealed by a prince, to ſerve as a law to his ſubjects. We find frequent mention of the edicts of the prætor, the ordinances of that officer in the Roman law. In the French law, the edicts are of ſeveral kinds: ſome importing a new law or regulation; others, the erection of new offices; eſtabliſhments of duties, rents, &c.; and ſometimes articles of pacification. In France, edicts are much the ſame as a proclamation is with us: but with this difference, that the former have the authority of a law in themſelves, from the power which iſſues them forth; whereas the latter are only declarations of a law, to which they refer, and have no power in themſelves.

EDINBURGH, a city of Mid-Lothian in Scotland, and capital of the whole kingdom; ſituated in W. Long. 3°. N. Lat. 56°.

1 Origin of the name.

The origin of the name of *Edinburgh*, like that of moſt other cities, is obſcure and uncertain. Some think it is derived from *Eth*, ſuppoſed to be a king of the Picts; others from *Edwin*, a Saxon prince of Northumberland, who, about the year 617, over-ran great part of the Pictiſh territories: others chooſe to derive it from two Gaelic words, *Dun-Edin*, which ſignify the face of a hill.—The name *Edinburgh* itſelf, however, ſeems to have been unknown in the time of the Romans. The moſt ancient title by which we find this city diſtinguiſhed, is that of *Caſtelh Mynyd Agned*; which, in the Britiſh language, ſignifies "the fortreſs of the hill of St Agnes." Afterwards it was named *Caſtrum Puellarum*, becauſe the Pictiſh princeſſes were educated in the caſtle (a neceſſary protection in thoſe barbarous ages) till they were married.—The ages in which theſe names were given, cannot indeed now be exactly aſcertained; but the town certainly cannot boaſt of very great antiquity, ſince, as Mr Whittaker informs us, the celebrated king Arthur fought a battle on the ſpot where it is ſituated, towards the end of the fifth century.

2 Time of its foundation uncertain.

The Romans, during the time they held the dominion of part of this iſland, divided their poſſeſſions into ſix provinces. The moſt northerly of theſe was called *Valentia*, which comprehended all the ſpace between the walls of ADRIAN and SEVERUS. Thus, Edinburgh, lying on the very out-ſkirts of that province which was moſt expoſed to the ravages of the barbarians, became perpetually ſubject to wars and devaſtations; by means of which, the time of its firſt foundation cannot now be gueſſed at.

The caſtle is certainly very ancient. It continued in the hands of the Saxons or Engliſh from the invaſion of *Octa* and *Ebuſa* in the year 452, till the defeat of Egfrid king of Northumberland in 685 by the Picts, who then repoſſeſſed themſelves of it. The Saxon kings of Northumberland reconquered it in the 9th century, and it was retained by their ſucceſſors till the year 956, when it was given up to Indulphus king of Scotland. In 1093 it was unſucceſsfully beſieged by the uſurper Donald Bane. Whether the city was at that time founded or not, is uncertain. Moſt probably it was: for as protection from violence was neceſſary in thoſe barbarous ages, the caſtle of Edinburgh could not fail of being an inducement to many people to ſettle in its neighbourhood; and thus the city would gradually be founded, and increaſe.—In 1128, king David I. founded the Abbey of Holyroodhouſe, for certain canons regular; and granted them a charter, in which he ſtyled the town, *Burgo meo de Edwineſburg*, "my borough of Edinburgh." By the ſame charter he granted theſe canons 40 ſhillings yearly out of the town revenues; and likewiſe 48 ſhillings more, from the ſame, in caſe of the failure of certain duties payable from the king's revenue; and likewiſe one half of the tallow, lard, and hides, of all the beaſts killed in Edinburgh.

3 Caſtle ſurrendered to the Engliſh.

In 1174, the caſtle of Edinburgh was ſurrendered to Henry II. of England, in order to purchaſe the liberty of king William I. who had been defeated and taken priſoner by the Engliſh. But when William recovered his liberty, he entered into an alliance with Henry, and married his couſin Ermengarde; upon which the caſtle was reſtored, as part of the queen's dower.

In 1215, this city was firſt diſtinguiſhed by having a parliament and provincial ſynod held in it.—In 1296, the caſtle was beſieged and taken by Edward I. of England; but was recovered from the Engliſh in 1313 by Randolph earl of Moray, who was afterwards regent of Scotland during the minority of king David II. At laſt king Robert deſtroyed this fortreſs, as well as all others in Scotland, leſt they ſhould afford ſhelter to the Engliſh in any of their after incurſions into Scotland.—It lay in ruins for a conſiderable number of years; but was afterwards rebuilt by Edward III. of England, who placed a ſtrong garriſon in it. In 1341 it was retaken by ſtratagem, and the Engliſh were finally driven out of the kingdom.

4
Becomes the capital of Scotland.

Towards the end of the 14th century, the city of Edinburgh began to be conſidered as the capital of Scotland. King Robert I. in 1329, had beſtowed upon the burgeſſes, the town of Edinburgh, with the harbour and mills of Leith. His great grandſon, John earl of Carrick, who afterwards aſſumed the name of Robert III. conferred on all the burgeſſes of Edinburgh the ſingular privilege of building houſes to themſelves within the caſtle, without any other limitation than that they ſhould be perſons of good fame.—In 1461, the inhabitants received Henry VI. of England when exiled, with ſuch humanity, that, in requital, he granted them liberty to trade in all the Engliſh ports, ſubject only to the duties which were paid by the citizens of London; but as Henry was never reſtored to the throne, this grant proved of no uſe.

5
Deſtroyed by the Engliſh.

Till the year 1542, nothing remarkable occurs in the hiſtory of Edinburgh. At that time a war was commenced with Henry VIII. of England through the treachery of cardinal Beaton. An Engliſh fleet of 200 ſail entered the Forth; and having landed their forces, quickly made themſelves maſters of the towns of Leith and Edinburgh. They next attacked the caſtle, but were repulſed from it with loſs; and by this they were ſo enraged, that they not only deſtroyed the towns of Edinburgh and Leith, but laid waſte the country for a great way round.—Theſe towns, however, ſpeedily recovered from their ruinous ſtate; and, in 1547, Leith was again burned by the Engliſh after the battle of Pinkey, but Edinburgh was ſpared.

Several diſturbances happened in this capital at the time of the reformation; but nothing of conſequence till the year 1570.—A civil war had commenced a few years before, on occaſion of queen Mary's forced reſignation. The regent, who was one of the contending parties, bought the caſtle from the perfidious governor for 5000l. and the priory of Pittenweem. He did not, however, long enjoy the fruits of this infamous bargain. Sir William Kirkaldy, the new governor, a man of great integrity and bravery, declared for the queen. The city in the mean time was ſometimes in the hands of one party, and ſometimes of another; during which contentions, the inhabitants, as may eaſily be imagined, ſuffered extremely. In the year 1570 above-mentioned, queen Elizabeth ſent a body of 1000 foot and 300 horſe, under the command of Sir William Drury, to aſſiſt the king's party. The caſtle was ſummoned to ſurrender; and ſeveral ſkirmiſhes happened during the ſpace of two years, in which a kind of predatory war was carried on. At laſt a truce was agreed on till the month of January 1573; and this opportunity the earl of Morton, now regent, made uſe of to build two bulwarks acroſs the high-ſtreet, nearly oppoſite to the tolbooth, to defend the city from the fire of the caſtle.

6
The caſtle ſurrendered to them.

On the firſt of January, early in the morning, the governor began to cannonade the city. Some of the cannon were pointed againſt the fiſh-market; and the bullets falling among the fiſhes, ſcattered them about in a ſurpriſing manner; and even drove them up ſo high in the air, that they fell down upon the tops of the houſes. This unuſual ſpectacle having brought a number of people out of their houſes, ſome of them were killed, and others dangerouſly wounded. Some little time afterwards, ſeveral houſes were ſet on fire by ſhot from the caſtle, and burned to the ground; which greatly enraged the people againſt the governor.—A treaty was at laſt concluded between the leaders of the oppoſite factions; but Kirkaldy refuſed to be comprehended in it. The regent therefore ſolicited the aſſiſtance of queen Elizabeth, and Sir William Drury was again ſent into Scotland with 1500 foot, and a train of artillery. The caſtle was now beſieged in form, and batteries raiſed againſt it in different places. The governor defended himſelf with great bravery for 33 days; but finding moſt of the fortifications demoliſhed, the well choaked up with rubbiſh, and all ſupplies of water cut off, he was obliged to ſurrender. The Engliſh general, in the name of his miſtreſs, promiſed him honourable treatment; but the queen of England ſhamefully gave him up to the regent, by whom he was hanged.

7
The city incurs the diſpleaſure of King James VI.

Soon after this, the ſpirit of fanaticiſm which ſome how or other ſucceeded the reformation, produced violent commotions, not only in Edinburgh, but thro' the whole kingdom. The foundation of theſe diſturbances, and indeed of moſt others which have ever happened in Chriſtendom on account of religion, was that pernicious maxim of Popery, that the church is independent of the ſtate. It is not to be ſuppoſed that this maxim was at all agreeable to the ſovereign; but ſuch was the attachment of the people to the doctrines of the clergy, that king James found himſelf obliged to compound matters with them. This, however, anſwered the purpoſe but very indifferently; and at laſt ſuch furious uproars were excited, that the king thought proper to declare Edinburgh an unfit place of reſidence for the court, or the adminiſtration of juſtice. In conſequence of this declaration, he commanded the college of juſtice, the inferior judges, and the nobility and barons, to retire from Edinburgh; and not to return without expreſs licenſe. This unexpected declaration threw the whole town into conſternation, and brought back the magiſtrates and principal inhabitants to a ſenſe of their duty. With the clergymen it was far otherwiſe. They railed againſt the king in the moſt furious manner; and endeavouring to perſuade the people to take up arms, the magiſtrates were ordered to impriſon them; which, however, they eſcaped by a timely flight. A deputation of the moſt reſpectable burgeſſes was then ſent to the king at Linlithgow, with a view to mitigate his reſentment. But he refuſed to be pacified; and, on the laſt day of December 1596, entered the town between two rows of his ſoldiers

Edinburgh.

diers who lined the ſtreets, while the citizens were commanded to keep within their houſes. A convention of the eſtates was held in the tolbooth, before whom the magiſtrates made the moſt abject ſubmiſſions, but all in vain. The convention declared one of the late tumults, in which an attack had been made upon the king's perſon, to be high treaſon; and ordained that, if the magiſtrates did not find out the authors, the city itſelf ſhould be ſubjected to all the penalties due to that crime. It was even propoſed to raze the town to the foundation, and erect a pillar on the ſpot where it had ſtood, as a monument of its crimes. The inhabitants were now reduced to the utmoſt deſpair; but queen Elizabeth interpoſing in behalf of the city, the king thought proper to abate ſomewhat of his rigour. A criminal proſecution, however, was commenced, and the town council were commanded to appear at Perth by the firſt of February. On their petition, the time for their appearance was prolonged to the firſt of March; and the attendance of 13 of the common-council was declared ſufficient, provided they had a proper commiſſion from the reſt. The trial commenced on the fifth day of the month; and one of the number having failed in his attendance, the cauſe was immediately decided againſt the council: they were declared rebels, and their revenues forfeited.

8 Received again into favour.

For 15 days the city continued in the utmoſt confuſion; but at laſt, on their earneſt ſupplication, and offering to ſubmit entirely to the king's mercy, the community were reſtored, on the following conditions, which they had formerly proffered: That they ſhould continue to make a moſt diligent ſearch for the authors of the tumult, in order to bring them to condign puniſhment; that none of the ſeditious miniſters ſhould be allowed to return to their charges, and no others admitted without his majeſty's conſent; and that in the election of their magiſtrates, they ſhould preſent a liſt of the candidates to the king and his lords of council and ſeſſion, whom his majeſty and their lordſhips might approve or reject at pleaſure. To theſe conditions, the king now added ſome others; *viz.* that the houſes which had been poſſeſſed by the miniſters ſhould be delivered up to the king; and that the clergymen ſhould afterwards live diſperſed through the town, every one in his own pariſh: That the town-council houſe ſhould be appointed for accommodating the court of exchequer; and that the town ſhould become bound for the ſafety of the lords of ſeſſion from any attempts of the burgeſſes, under a penalty of 40,000 merks; and laſtly, that the town ſhould immediately pay 20,000 merks to his majeſty.

Upon theſe terms a reconciliation took place. The king, in a ſhort time, ſuffered the degraded miniſters to be replaced, and nothing remarkable happened till the reign of king Charles I. It was in the city of Edinburgh that the diſturbances about religion commenced; which ended not but with the death of that unhappy monarch, and the total ſubverſion of the Britiſh conſtitution. Here the covenants were framed, and the reſt of thoſe violent and enthuſiaſtical meaſures concerted, an account of which is given under the article BRITAIN, n° 76. *et ſeq.*

9 Remarkable execution of captain Porteous.

From this time, to the preſent, the hiſtory of Edinburgh ſcarce affords any thing worthy of notice, except the remarkable execution of John Porteous, captain of the city-guard, in 1736. This was conducted in a tumultuous manner, but at the ſame with ſuch impenetrable ſecrecy as muſt render it memorable to the lateſt poſterity. The origin of the whole affair was the execution of a ſmuggler in the graſs-market. Some diſturbance being raiſed on this occaſion, captain Porteous ordered his men to fire among the mob which uſually aſſembles in ſuch caſes. By the diſcharge of their muſkets ſix people were killed, and eleven dangerouſly wounded: and for this offence, Porteous was proſecuted at the city's expence; and after trial, ſentenced to die. King George II. happening to be at that time in Hanover, queen Caroline was regent in his abſence, who reprieved the criminal. This highly enraged the people; who, conſidering the unprovoked cruelty of Porteous, (or perhaps for ſome other reaſons), did not think him a proper object of mercy. On the night before that on which his execution ſhould have taken place according to his ſentence, a number of people aſſembled from different quarters variouſly diſguiſed. They ſurpriſed and diſarmed the town-guard, and took poſſeſſion of the city-gates to prevent the entrance of troops who were quartered in the ſuburbs. They then proceeded to the priſon; the doors of which, being too ſtrong to be broke open, they burnt, and diſmiſſed all the priſoners, Porteous alone excepted. The magiſtrates endeavoured to diſperſe them; but they were pelted with ſtones, and threatened to be fired upon. General Moyle was requeſted by the member of parliament for the city, to ſend a body of troops to the aſſiſtance of the magiſtrates; but this he refuſed, becauſe no written order could be procured for that purpoſe. In the mean time, Porteous was conducted to the Graſs-market, near to the place where the people had been killed: there the ringleaders of the affair, having broke open a ſhop, and paid for a coil of ropes, hanged him upon a dyer's ſign-poſt; after which, the whole body diſperſed without committing any other diſorder.

10 Government highly incenſed on that account.

This was highly reſented, and conſidered as an inſult to government. A pardon was promiſed to the offenders provided they would diſcover their accomplices; and a reward of 200 l. was offered for every perſon ſo diſcovered: but notwithſtanding all the inquiry that could be made, there hath not, to this day, tranſpired the leaſt intelligence concerning the matter, nor even the name of a ſingle perſon who had a hand in it. The vengeance of government then fell upon the magiſtrates of Edinburgh. The lord provoſt was taken into cuſtody, and confined almoſt three weeks before he was admitted to bail. He was then ordered to attend the houſe of lords, along with four bailies of Edinburgh, and three of the lords of juſticiary. Theſe laſt, after ſome debate, were ordered to attend the bar in their robes. The houſe firſt took into conſideration the legality of the ſentence by which Porteous had been condemned. Both the ſentence of the conrt, and the verdict of the jury, were cenſured by ſome of the members, and a motion was made to declare them erroneous; but, by a majority of voices, both the ſentence and verdict were fully juſtified. A bill was then brought in for impriſoning the provoſt of Edinburgh for a full year, diſabling him for ever from bearing any public office in that city, or any other in Great Britain; for aboliſhing the city-guard, and taking down

11 The city puniſhed.

down the gate at the Netherbow-port. This bill paſſed the houſe of lords without any amendment. When ſent down to the houſe of commons, the impriſonment of the provoſt, the aboliſhing of the city-guard, and the taking down of the gate, were left out; and in place of theſe, a fine of 2000 l. was impoſed on the city, to be applied to the uſe of Porteous's widow: and with this amendment the bill paſſed with the majority of a ſingle voice.—To prevent ſuch cataſtrophes in time coming, the town-council enacted, that, on the firſt appearance of an inſurrection, the chief officers in the different ſocieties and corporations ſhould repair to the council, to receive the orders of the magiſtrates for the quelling of the tumult, under penalty of 8 l. 6 s. 8 d. for each omiſſion.

13 Taken by the Highlanders in 1745.

In 1745, the city was inveſted by the Pretender's army; and on the 17th of September, the Netherbow-gate being opened to let a coach paſs, a party of Highlanders, who had reached the gate undiſcovered, ruſhed in, and took poſſeſſion of the city. The inhabitants were commanded to deliver up their arms at the palace of Holyroodhouſe; a certain quantity of military ſtores were required from the city, under pain of military execution; and an aſſeſſment of 2 s. 6 d. upon the pound was impoſed upon the *real* rents within the city and liberties, for defraying that expence.

The Pretender's army guarded all the avenues to the caſtle; but no ſigns of hoſtility enſued till the 25th of the month, when the garriſon being alarmed from ſome unknown cauſe, a number of cannon were diſcharged at the guard placed at the Weſt-port, but with very little effect. This gave occaſion to an order to the guard at the weigh-houſe, to prevent all intercourſe between the city and caſtle; and then the governor acquainted the provoſt by letter, that unleſs the communication was preſerved, he would be obliged to diſlodge the guard by means of artillery. A deputation was next ſent to the Pretender; acquainting him with the danger the city was in, and intreating him to withdraw the guard. With this he refuſed to comply; and the Highland centinels firing at ſome people who were carrying proviſions into the caſtle, a pretty ſmart cannonading enſued, which ſet on fire ſeveral houſes, killed ſome people, and did other damage. The Pretender then conſented to diſmiſs the guard, and the cannonading ceaſed.—After the battle of Culloden, the provoſt of Edinburgh was obliged to ſtand a very long and ſevere trial, firſt at London and then at Edinburgh, for not defending the city againſt the rebels; which, from the ſituation and extent of the walls, every one muſt have ſeen to be impoſſible. At laſt, however, he was exculpated; and, ſince that time, no other differences have happened between the government and magiſtrates of Edinburgh.

14 New magiſtrates elected.

The rebellion in 1745 put a temporary ſtop to the exiſtence of the city of Edinburgh as a body corporate. The time for electing magiſtrates happened while the town was in poſſeſſion of the rebels, ſo that the election could not be held; and thus, for a whole year, Edinburgh was left deſtitute of any civil government.—Application, however, was made to the king for reſtoring the government. He was graciouſly pleaſed to grant their requeſt, and the election of magiſtrates proceeded accordingly. The following year they addreſſed his majeſty on the ſuppreſſion of the rebellion, and preſented the duke of Cumberland with the freedom of the city incloſed in a gold box.—Since that time, the city hath remained free from every kind of trouble; hath flouriſhed in a remarkable manner; and been enlarged and embelliſhed with many new and fine buildings, of which an account is given in the ſubſequent deſcription.

15 Deſcription of the town.

Edinburgh is ſituated upon a ſteep hill, riſing from eaſt to weſt, and terminating in a high and inacceſſible rock, upon which the caſtle ſtands. At the eaſt end or lower extremity of this hill, ſtands the abbey of Holyrood-houſe, or king's palace, diſtant from the caſtle upwards of a mile; and betwixt which, along the top of the ridge, and almoſt in a ſtraight line, runs the high-ſtreet. On each ſide, and parallel to this ridge or hill, is another ridge of ground lower than that in the middle, and which does not extend ſo far to the eaſt; that on the ſouth being intercepted by Saliſbury-rocks, and Arthur's-ſeat, a hill of about 650 feet of perpendicular height; and that on the north by the Calton-hill, conſiderably lower than Arthur's-ſeat: ſo that the ſituation of this city is moſt ſingular and romantic; the eaſt or lower part of the town lying between two hills; and the weſt or higher part riſing up towards a third hill, little inferior in height to the higheſt of the other two, upon which, as has been obſerved, the caſtle is built, and overlooks the town.

The buildings of the town terminate at the diſtance of about 200 yards from the caſtle-gate; which ſpace affords a moſt delightful as well as convenient and healthful walk to the inhabitants. The proſpect from this ſpot is perhaps the fineſt any where to be met with, for extent, beauty, and variety.

In the valley or hollow betwixt the mid and ſouth ridge, and nearly parallel to the high-ſtreet, is another ſtreet called the Cowgate; and the town has now extended itſelf over moſt part of that ſouth ridge alſo. Betwixt the mid and north ridge was a loch, which, till of very late, terminated the town on that ſide. From the high-ſtreet towards the loch on the north, and Cowgate on the ſouth, run narrow croſs ſtreets or lanes, called *wynds* and *cloſſes*, which grow ſteeper and ſteeper the farther weſt or nearer the caſtle; ſo that, were it not for the cloſeneſs and great height of the buildings, this city, from its ſituation and plan, might naturally be expected to be the beſt aired, as well as the cleanlieſt, in Europe. The firſt, notwiſtanding theſe diſadvantages, it enjoys in an eminent degree; but we cannot compliment it upon the latter, notwithſtanding every poſſible means has been uſed by the magiſtrates for that purpoſe.

The ſteepneſs of the aſcent makes the acceſs to the high-ſtreet from the north and ſouth very difficult; and has no doubt greatly retarded the enlargement of this city. To remedy this inconvenience on the north, and with a view to extend the town on that quarter, a moſt elegant bridge has been thrown over the north loch, which joins the north ridge to the middle of the high-ſtreet, by ſo eaſy an aſcent as one in ſixteen; and in purſuance of the deſign, a plan of a new town to the north was fixed upon, and has for ſeveral years paſt been carrying into execution with an elegance and taſte that does honour to this country.

The gradual increaſe of the city of Edinburgh may

16 Account of its gradual increaſe.

in ſome degree be underſtood from the traces of its ancient walls that ſtill remain. James II. in 1450, firſt beſtowed on the community the privilege of fortifying the city with a wall, and empowered them to levy a tax upon the inhabitants for defraying the expence. When the city was firſt fortified, the wall reached no further than the preſent water-houſe, or reſervoir, on the caſtle-hill: from thence to the foot of Halkerſtown's wynd, juſt below the new-bridge, the city was defended by the north-loch; an inconſiderable moraſs, which, being formerly overflowed, formed a ſmall lake, that hath ſince been drained. From this place to the foot of Leith-wynd, it doth not appear how the city was fortified, but from the foot of Leith-wynd to the netherbow-port, it was defended only by a range of houſes; and when theſe became ruinous, a wall was built in their place. The original wall of Edinburgh, therefore, began at the foot of the north-eaſt rock of the caſtle. Here it was ſtrengthened by a ſmall fortreſs, the ruins of which are ſtill to be ſeen, and are called the *well-houſe tower*, from their having a ſpring in their neighbourhood. When it came oppoſite to the reſervoir, it was carried quite acroſs the hill, having a gate on the top for making a communication between the town and caſtle. In going down the hill, it went ſlanting in an oblique direction to the firſt angle in going down the weſt-bow, where was a gate named the *Upper-bow port*, one of the hooks of which ſtill remains. Thence it proceeded eaſtward in ſuch a manner, as would have cut off not only all the Cowgate, but ſome part of the parliament-houſe; and being continued as far as the mint-cloſe, it turned to the north-eaſt, and connected itſelf with the buildings on the north-ſide of the high ſtreet, where was the original *Netherbow port*, about 50 yards weſt from that which afterwards went by the ſame name.

Soon after the building of this wall, a new ſtreet was formed on the outſide of it, named the *Cowgate*, which in the 16th century became the reſidence of the nobility, the ſenators of the college of juſtice, and other perſons of the firſt diſtinction. After the fatal battle of Flowden, however, the inhabitants of the Cowgate became very anxious to have themſelves defended by a wall as well as the reſt. The wall of the city was therefore extended to its preſent limits. This new wall begins on the ſouth-eaſt ſide of the rock on which the caſtle is built, and to which the town-wall comes quite cloſe. From thence it deſcends obliquely to the weſt port; then aſcends part of a hill on the other ſide, called the *High Riggs*; after which, it runs eaſtwards, with but little alteration in its courſe, to the Briſto and Potter-row ports, and from thence to the Pleaſance. Here it takes a northerly direction, which it keeps from thence to the Cowgate-port; after which the incloſure is completed to the Netherbow by the houſes of St Mary wynd. The original Netherbow-port being found not well adapted for defence was pulled down, and a new one built in 1571 by the adherents of queen Mary. In 1606, the late handſome building was erected about 50 yards below the place where the former ſtood. It was two ſtories high, and had an elegant ſpire in the middle; but being thought to encumber the ſtreet, and the whole building being in a crazy ſituation, it was pulled down by order of the magiſtrates in 1764.

In the original wall of Edinburgh there was, as has been already obſerved, a port on the caſtle-hill. On the extenſion of the wall, after building the houſes in the Cowgate, this gate was pulled down. That in the upper or weſt bow, ſtood for a much longer time, and was pulled down within the memory of ſome perſons ſtill living. Beſides theſe, there was a third, about 50 yards above the head of the Canongate; but whether there were any more, is uncertain. The ports or gates of the new walls are, 1. The *Weſt-port*, which is ſituated at the extremity of the Graſs-market; beyond which lies a ſuburb of the town and a borough of regality, called *Portſborough*. Next to this is a wicket, ſtruck out of the town-wall in 1744, for the purpoſe of making an eaſier communication between the town and the public walks in the meadows, than by Briſto-port. The next to this is *Briſto-port*, built in 1515; beyond which lies a ſuburb called *Briſto-ſtreet*. At a ſmall diſtance from Briſto, is the *Potterrow-port*, which took this name from a manufactory of earthen ware in the neighbourhood. Formerly it was called *Kirk of Field Port*. Between this and the Cowgate port ſtood another, called *St Mary Wynd Port*, which extended from eaſt to weſt acroſs the foot of the Pleaſance, and which was demoliſhed only ſince the middle of the laſt century.—Cloſe to the place where this port was, ſtands the *Cowgate-port*; which opens a communication between the Cowgate and St Mary's Wynd, and the Pleaſance.—The *Netherbow-port* has been already ſpoke of.—At the foot of Leith-wynd was another gate, known by the name of *Leith-wynd port*; and within it was a wicket giving acceſs to the church of Trinity College, and which ſtill remains. At the foot of Halkerſton's-wynd was another, which, as well as the former, was built about the year 1560. Both were pulled down ſome years ago.—Another ſtill remains at the foot of the Canongate, known by the name of the *Water-gate*.

For 250 years the city of Edinburgh occupied the ſame ſpace of ground, and it is but very lately that its limits have been ſo conſiderably enlarged. In the middle of the 16th century, it is deſcribed as extending in length about an Italian mile, and about half as much in breadth; which anſwers very nearly to its preſent limits, the late enlargements only excepted.—This ſpace of ground, however, was not at that time occupied in the manner it is at preſent. The houſes were neither ſo high nor ſo crowded upon each other as they are now. This was a conſequence of the number of inhabitants increaſing, which has occaſioned the raiſing of the houſes to ſuch an height as is perhaps not to be paralleled in any other part of the world. Till the time of the Reformation, the burying ground of the city extended over all the ſpace occupied by the Parliament-ſquare, and from thence to the Cowgate. The lands lying to the ſouthward of the Cowgate were chiefly laid out in gardens belonging to the convent of Black-friars, and the church of St Mary in the Field. Theſe extended almoſt from the Pleaſance to the Potterrow-port. From the Briſto to the Weſt Port, the ground was laid out in gardens belonging to the Gray-friars. The magiſtrates, on their application to queen Mary, obtained a grant of the Gray-friars gardens for a burying place; for which it was given as a reaſon, that they were ſomewhat diſtant from the town. Here, however, it muſt be underſtood, that theſe gardens were diſtant from the houſes, and not without the walls; for they had been encloſed by them long before.—In the time of James I. the houſes within the walls ſeem to have been in general, if not univerſally, covered with thatch or broom; and not above 20 feet high. Even in the year 1621, theſe roofs were ſo common, that they were prohibited by act of parliament, in order to prevent accidents from fire.—In the middle of the laſt century, there were neither courts nor ſquares in Edinburgh. The Parliament *cloſe* or ſquare is the oldeſt of this kind in the city. Milne's ſquare, James's court, &c. were built long after; and Argyle's and Brown's ſquares within theſe 30 years.

17 New Town.

The *New Town* was projected in the year 1752; but as the magiſtrates could not then procure an extenſion of the royalty, the execution of the deſign was ſuſpended for ſome time. In 1767, an act was obtained, by which the royalty was extended over the fields to the northward of the city; upon which, advertiſements were publiſhed by the magiſtrates, deſiring proper plans to be given in. Plans were given in accordingly, and that deſigned by Mr James Craig architect was adopted. Immediately afterwards, people were invited to purchaſe lots from the town-council; and ſuch as purchaſed, became bound to conform to the rules of the plan. In the mean time, however, the town-council had ſecretly reſerved to themſelves a privilege of departing from their own plan; which they afterwards made uſe of in ſuch a manner as produced a law-ſuit. According to the plan held forth to the purchaſers, a canal was to be made through that place where the north-loch had been, and the bank on the north ſide of it laid out in terraces: but, inſtead of this, by an act of council, liberty was reſerved to the town to build upon this ſpot; and therefore, when many gentlemen had built genteel houſes in the new town, on faith of the plan, they were ſurpriſed to find the ſpot appointed for terraces and a canal, beginning to be covered with mean irregular buildings, and work-houſes for tradeſmen. This deviation was immediately complained of; but as the magiſtrates ſhewed no inclination to grant any redreſs, a proſecution was commenced againſt them before the Lords of Seſſion. In that court the cauſe was given againſt the purſuers, who thereupon appealed to the Houſe of Lords. Here the ſentence of the court of ſeſſion was reverſed, and the cauſe remitted to the conſideration of their lordſhips. At laſt, after an expenſive conteſt, matters were accommodated. The principal term of accommodation was, that ſome part of the ground was to be laid out in terraces and a canal; but the time of diſpoſing it in that manner, was referred to the lord preſident of the court of ſeſſion and the lord chief baron of the exchequer.—The fall of the bridge proved a very conſiderable diſadvantage to the new town; as it neceſſarily induced a ſuſpicion that the paſſage, by means of the bridge, could never be rendered ſafe. An overſight of the magiſtrates proved of more eſſential detriment. A piece of ground lay to the ſouthward of the old town, in a ſituation very proper for building. This the magiſtrates had an opportunity of purchaſing for 1200l.; which, however, they neglected, and it was bought by a private perſon, who immediately feued it out in lots for building. The magiſtrates then foreſaw the conſequence, namely, that this ſpot being free from the duties to which the royalty of Edinburgh is ſubject, people would chooſe to reſide there rather than in the new town. Upon this they offered the purchaſer 2000l. for the ground for which he had paid 1200l.; but as he demanded 20,000l. the bargain was not concluded.—Notwithſtanding theſe diſcouragements, the new town hath made a very conſiderable progreſs; and from the advantages of its ſituation, and its being built according to a regular plan, it hath undoubtedly a ſuperiority over any city in Britain. By its ſituation, however, it is remarkably expoſed to ſtorms of wind, which, at Edinburgh, ſometimes rage with uncommon violence.

The moſt remarkable public buildings of Edinburgh are,

18 Account of the public buildings, &c.

1. *The Caſtle.* This ſtands on a high rock, acceſſible only on the eaſt ſide. On all others it is very ſteep, and in ſome places perpendicular. It is about 300 feet high from its baſe: ſo that, before the invention of artillery, it might well have been deemed impregnable; though the event ſhowed that it was not.—The entry to this fortreſs is defended by an outer barrier of palliſadoes; within this is a dry ditch, draw-bridge, and gate, defended by two batteries which flank it; and the whole is commanded by an half-moon mounted with braſs cannon, carrying balls of 12 pounds. Beyond theſe are two gate-ways, the firſt of which is very ſtrong, and has two portculliſes. Immediately beyond the ſecond gateway, on the right hand, is a battery mounted with braſs cannon, carrying balls of 12 and 18 pounds weight. On the north ſide are a mortar and ſome gun batteries.—The upper part of the caſtle contains ſeveral half-moon batteries, a chapel, a parade for exerciſe, and a number of houſes in the form of a ſquare, which are laid out in barracks for the officers. Beſides this there are other barracks, which are able to contain 1000 men; a powder-magazine bomb-proof; a grand arſenal, capable of containing 8000 ſtand of arms; and other apartments for the ſame uſe, which can contain 22,000 more: ſo that 30,000 ſtand of arms may be conveniently lodged in this caſtle.—On the eaſt ſide of the ſquare above-mentioned, were formerly royal apartments, in one of which king James VI. was born, and which is ſtill ſhewn to thoſe who viſit the caſtle. In another, the regalia of Scotland were depoſited on the 26th of March 1707, and are ſaid to be ſtill kept there; but they are never ſhown to any body.

The caſtle is defended by a company of invalids, and four or five hundred men belonging to ſome marching regiment, though it can accommodate 1000, as above-mentioned; and this number has been ſometimes kept in it. It hath a governor, fort-major, gunner, ſtoremaſter, &c. &c.—Its natural ſtrength of ſituation was not able to render it impregnable, even before the invention of artillery, as we have already obſerved. Much leſs would it be able to ſecure it againſt the attacks of a modern army well provided with cannon. It could not, in all probability, withſtand, even for a few hours, a well directed bombardment; for no part but the powder-magazine is capable of reſiſting theſe deſtructive machines; and the ſplinters from the rock on which the caſtle is built, could not fail to render them ſtill more formidable. Beſides, the water of the well, which is very bad, and drawn up from a depth of 100 feet, is apt to ſubſide on the continued diſcharge of artillery, which produces a concuſſion in the rock.

2. *The palace of Holyrood-houſe* is of a quadrangular form, and bears ſome reſemblance to that of Hampton court. In the centre is a court ſurrounded with piazzas. The front is two ſtories high; the roof flat; but at each end the front projects, and is ornamented with circular towers at the angles. Here the building is much higher, and the reſt of the palace is three ſtories in height. Over the door of the front is a clock and ſmall cupola, the roof of which is an imperial crown in ſtone-work. The north-weſt towers were built by James V. for his own reſidence: his name is ſtill to be ſeen below a nitch in one of theſe towers. During the minority of queen Mary, this palace was burned by the Engliſh; but ſoon after repaired, and enlarged beyond its preſent ſize. At that time it conſiſted of five courts, the moſt weſterly of which was the largeſt. It was bounded on the eaſt by the front of the palace, which occupied the ſame ſpace it does at preſent; but the building itſelf extended further to the ſouth. At the north-weſt corner was a ſtrong gate, with Gothic pillars, arches, and towers, part of which was but lately pulled down.—Great part of the palace was burnt by Cromwell's ſoldiers; but it was repaired, and altered into the preſent form, after the Reſtoration. The fabric was planned by Sir William Bruce, a celebrated architect, and executed by Robert Mylne, maſon.—The only apartments worthy of notice, are thoſe now poſſeſſed by the duke of Hamilton, heritable keeper of the palace. In the ſecond floor are queen Mary's apartments; in one of which her own bed remains. It is of crimſon damaſk, bordered with ſilk taſſels and fringes, but now almoſt reduced to rags. Cloſe to the floor of this room is a piece of wainſcot which hangs upon hinges, and communicates with a trap-ſtair that goes down into the apartment below. Through this paſſage the conſpirators ruſhed in who murdered David Rizzio; and towards the outer door are ſhewn ſome large duſky ſpots in the floor, ſaid to be occaſioned by his blood, which could not be waſhed out.—The environs of the palace afford an aſylum for inſolvent debtors; and adjoining to it is an extenſive park, all of which is a ſanctuary.

3. *Heriot's Hoſpital* owes its foundation to one George Heriot a goldſmith, who, in the days of James VI. acquired by his buſineſs (being goldſmith to the king and queen) a large fortune. At his death, he left the magiſtrates of Edinburgh 23,625l. 10s. "for the maintenance, relief, and bringing up of ſo many poor and fatherleſs boys, freemens ſons of the town of Edinburgh," as the above ſum ſhould be ſufficient for. This hoſpital is finely ſituated on the weſt end of the ſouth ridge, almoſt oppoſite to the caſtle, and is perhaps the moſt magnificent building of the kind in Edinburgh. It was founded in July 1628, according to a plan (as is reported) of Inigo Jones; but the work being interrupted by the civil wars, it was not finiſhed till the year 1650. The expence of the building is ſaid to have been upwards of 30,000l.*: and the hoſpital is ſtill poſſeſſed of an income of about 1800l. a-year; though this cannot be abſolutely aſcertained, as the rents are paid in grain, and of courſe muſt be fluctuating.—When Cromwell took poſſeſſion of Edinburgh after the battle of Dunbar, he quartered his ſick and wounded ſoldiers in this hoſpital. It was applied to the ſame purpoſe till the year 1658, when general Monk, at the requeſt of the governors, removed the ſoldiers; and on the 11th of April 1659, it was opened for the reception of boys, 30 of whom were admitted into it. The Auguſt after, they were increaſed to 40; and in 1661, to 52. In 1753 they were raiſed to 130, and in 1763 to 140; but the number has ſince that time decreaſed.—In this hoſpital the boys are inſtructed in reading, writing, arithmetic, and a knowledge of the Latin tongue. With ſuch as chuſe to follow any kind of trade, an apprentice-fee of 30l. is given when they leave the hoſpital; and thoſe who chuſe an academical education, have an annuity of 10l. a-year beſtowed on them for four years.

4. *Watſon's Hoſpital* is an inſtitution of the ſame kind with Heriot's; but the building is much leſs magnificent. The funds are alſo leſs. They were in all 12,000l. left by George Watſon in 1723 for endowing an hoſpital; which, however, was not carried into execution till the year 1738, when the abovementioned ſum, with the intereſt accumulated during that time, amounted to 20,000l. About 60 boys are at preſent educated in Watſon's hoſpital. On their being put out apprentices, 20l. of apprentice-fee is paid with them; or if they chuſe to go to college, they receive 10l. for five years. On their attaining the age of 25 years, if they have behaved properly, and not contracted marriage without conſent of the governors, they receive a bounty of 50l. The funds of this hoſpital amount to 1700l. a-year.

5. *The Orphan Hoſpital* was planned in 1732 by Andrew Gairdner merchant, and other inhabitants. It was promoted by the ſociety for propagating Chriſtian knowledge, by other ſocieties, voluntary ſubſcriptions, and a collection at the church-doors.—In 1733, the managers hired a houſe, took in 30 orphans, maintained them, gave them inſtructions in reading and writing, and taught them the weaving buſineſs. In 1735, they were erected into a body corporate by the town of Edinburgh: and, in 1742, obtained a charter of erection from his late majeſty, appointing moſt of the great officers of ſtate in Scotland, and the heads of the different ſocieties in Edinburgh, members of this corporation; with powers to them to hold real property to the amount of 1000l. a-year. The revenue is inconſiderable; but the inſtitution is ſupported by the contributions of charitable perſons,

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* It is to be obſerved, that money then bore 10l. *per cent.* intereſt.—The above ſums are taken from Mr Arnot's Hiſtory of Edinburgh, who ſubjoins the following note. "Where Maitland had collected his moſt erroneous account of George Heriot's effects, we do not know. He makes the ſum received, out of Heriot's effects, by the governors of the hoſpital, to be 43,608l. 11s. 3d. being almoſt the double of what they really got. This blunder has been the cauſe of many unjuſt murmurings againſt the magiſtrates of Edinburgh, and even the means of ſpiriting up law-ſuits againſt them."

and collections at the church-doors. Into this hoſpital orphans are received from any part of the kingdom. None are admitted under ſeven, nor continued in it after 14, years of age. About 100 orphans are maintained in it.

6. *The Merchants Maiden Hoſpital* was eſtabliſhed by voluntary contribution about the end of the laſt century, for the maintenance of young girls, daughters of the merchants burgeſſes of Edinburgh. The governors were erected into a body corporate, by act of parliament, in 1707. The annual revenue amounts to 1350l. Seventy girls are maintained in it; who, upon leaving the houſe, receive 3l. 6s. 8d. excepting a few who are allowed 8l. 6s. 8d. out of the funds of the hoſpital. The profits ariſing from work done in the houſe are alſo divided among the girls, according to their induſtry.

7. *The Trades Maiden Hoſpital* was founded in the year 1704 by the incorporations of Edinburgh, for the maintenance of the daughters of decayed members, on a plan ſimilar to that of the merchants hoſpital. To this, as well as to the former, one Mrs Mary Erſkine, a widow gentlewoman, contributed ſo liberally, that ſhe was by the governors ſtyled *joint foundreſs* of the hoſpital. Fifty girls are maintained in the houſe, who pay of entry-money 1l. 13s. 4d.; and, when they leave it, receive a bounty of 5l. 11s. 1½d. The revenues are eſtimated at 600l. a-year.

8. *The Trinity Hoſpital.* This was originally founded and amply endowed by king James II's queen. At the Reformation, it was ſtripped of its revenues; but the regent afterwards beſtowed them on the provoſt of Edinburgh, who gave them to the citizens for the uſe of the poor. In 1585, the town-council purchaſed from Robert Pont, at that time provoſt of Trinity college, his intereſt in theſe ſubjects; and the tranſaction was afterwards ratified by James VI. The hoſpital was then repaired, and appointed for the reception of poor old burgeſſes, their wives, and unmarried children, not under 50 years of age. In the year 1700, this hoſpital maintained 54 perſons; but, ſince that time, the number has decreaſed.—The revenue conſiſts in a real eſtate of lands and houſes, the groſs rent of which is 762l. a-year; and 5500l. lent out in bonds at 4 per cent.

Beſides theſe charitable inſtitutions, there are alſo three charity work-houſes; one belonging to the town, another to the Canongate, and the third to the Weſt-kirk pariſh. They maintain, in all, about 900 men, women, and children.

9. *The Royal Infirmary* was firſt thought of by the college of phyſicians in 1725. A fiſhing company happening to be diſſolved at that time, the partners contributed ſome of their ſtock towards the eſtabliſhment of the infirmary. A ſubſcription was alſo ſet on foot, and application made to the general aſſembly to recommend the ſame throughout their juriſdiction. This was readily complied with, and the aſſembly paſſed an act for that purpoſe; but very little regard was paid to it by the clergy. Notwithſtanding this, however, 2000l. being procured, a ſmall houſe was opened for the reception of the ſick poor in Auguſt 1729. In 1736, the contributors towards the infirmary were erected into a body corporate by royal ſtatute; and after this the contributions increaſed very conſiderably: by which means, the managers were enabled to enlarge their ſcheme from time to time; and at laſt to undertake the preſent magnificent ſtructure, the foundation of which was laid in 1738. During 25 years, when this inſtitution was in its infancy, Lord Hopetoun beſtowed upon it an annuity of 400l. In 1750, Doctor Archibald Ker bequeathed to this corporation an eſtate of 200l. a-year in the iſland of Jamaica. In 1755, the lords of the treaſury made a donation to it of 8000l. which had been appointed for the ſupport of invalids. In return for this, the managers of the infirmary conſtantly keep 60 beds in readineſs for the reception of ſick ſoldiers. This year alſo ſick ſervants began to be admitted into the infirmary, and a ward was fitted up for their reception.

This inſtitution, however, was more indebted to George Drummond, Eſq; than to any other perſon. He was ſeven times choſen lord provoſt of Edinburgh, and always directed his attention to the improvement of the city, particularly to that of the royal infirmary. So ſenſible were the managers of their obligations to him, that, in their hall, they erected a buſt of him with this inſcription, "George Drummond, to whom this country is indebted for all the benefit which it derives from the Royal Infirmary."—In 1748, the ſtock of the infirmary amounted to 5000l.; in 1755, to 7076l. beſides the eſtate left by Doctor Ker; in 1764, to 23,426l.; and in 1778, to 27,074l.

The royal infirmary is attended by two phyſicians choſen by the managers, who viſit their patients daily in preſence of the ſtudents. All the members of the college of ſurgeons are alſo obliged to attend in rotation, according to ſeniority. If any ſurgeon declines attendance, he is not allowed to appoint a depute; but the patients are committed to the care of one of four aſſiſtant ſurgeons, choſen annually by the managers.—From the year 1762 to 1769, there were admitted 6261 patients; which number added to 109 who were in the hoſpital at the commencement of the year 1762, made, in all, 6370. Of theſe, 4394 were cured; 358 died; the reſt were either relieved, diſmiſſed incurable, for irregularities, or by their own deſire, or remained in the hoſpital.—From 1770 to 1775, the patients annually admitted into the infirmary were, at an average, 1567; of whom 63 died. In 1776, there were admitted 1668, of whom 57 died; and in 1777, the number admitted was 1593, and of deaths 52.

The building conſiſts of a body and two wings, each of them three ſtories high, with an attic ſtory and garrets, and a very elegant front. The body is 210 feet long, and 36 broad in the middle, but at the ends only 24 feet broad. The wings are 70 feet long, and 24 broad. In the centre is a large ſtair-caſe, ſo wide that ſedan chairs may be carried up. In the different wards, 228 patients may be accommodated, each in a different bed. There are cold and hot baths for the patients, and alſo for the citizens; and to theſe laſt the patients are never admitted.

10. *The Bridge.* The firſt ſtone of this building was laid by provoſt Drummond in 1763; but the contract for building it was not ſigned till Auguſt 21ſt 1765. The architect was Mr William Mylne, who agreed with the town-council of Edinburgh to finiſh the work for 10,140l. and to uphold it for 10 years. It was alſo to be finiſhed before Martinmas 1769: but, on the 3d

of Auguſt that year, when the work was nearly completed, the vaults and ſide-walls on the ſouth fell down, and five people were buried in the ruins. This misfortune was occaſioned by the foundation having been laid, not upon the ſolid earth, but upon the rubbiſh of the houſes which had long before been built on the north ſide of the high-ſtreet, and which had been thrown out into the hollow to the northward. Of this rubbiſh, there were no leſs than eight feet between the foundation of the bridge and the ſolid earth. Beſides this deficiency in the foundation, an immenſe load of earth which had been laid over the vaults and arches in order to raiſe the bridge to a proper level, had no doubt contributed to produce the cataſtrophe above-mentioned. —The bridge was repaired, by pulling down ſome parts of the ſide-walls, and afterwards rebuilding them; ſtrengthening them in others with chain-bars; removing the quantity of earth laid upon the vaults, and ſupplying its place with hollow arches, &c. The whole was ſupported at the ſouth end by very ſtrong buttreſſes and counterforts on each ſide; but on the north it has only a ſingle ſupport.—The whole length of the bridge, from the High-ſtreet in the Old Town, to Prince's-ſtreet in the New, is 1125 feet; the total length of the piers and arches is 310 feet. The width of the three great arches, is 72 feet each; the piers 13 feet and an half; the ſmall arches, each 20 feet. The height of the great arches, from the top of the parapet to the baſe, 68 feet; the breadth of the bridge within wall over the arches, 40 feet; and the breadth at each end, 50 feet.

11. *The Regiſter Office.* This work was firſt ſuggeſted by the late earl of Morton, lord-regiſter of Scotland, with a view to prevent the danger which attended the uſual method of keeping the public records. In former times, indeed, theſe ſuffered from a variety of accidents. Edward I. carried off or deſtroyed moſt of them, in order to prevent any marks of the former independency of the nation from remaining to poſterity. Afterwards Cromwell ſpoiled this nation of its records, moſt of which were ſent to the tower of London. At the time of the Reſtoration, many of them were ſent down again by ſea; but one of the veſſels was ſhipwrecked, and the records brought by the other have ever ſince been left in the greateſt confuſion.—The earl of Morton, taking this into conſideration, obtained from his majeſty a grant of 12,000l. out of the forfeited eſtates, for the purpoſe of building a regiſter-office, or houſe for keeping the records, and diſpoſing them in proper order. The foundation was laid on the 27th of June 1774, by Lord Frederic Campbell, lord-regiſter; Mr Montgomery of Stanhope, lord advocate; and Mr Miller of Barſkimming, lord juſtice-clerk; three of the truſtees appointed by his majeſty for executing the work. The ceremony was performed under a diſcharge of artillery, in preſence of the judges of the courts of ſeſſion and exchequer, and in the ſight of a multitude of ſpectators. A braſs plate was put into the foundation-ſtone, with the following inſcription: CONSERVANDIS TABULIS PUBLICIS POSITUM EST, ANNO M DCC LXXIV, MUNIFICENTIA OPTIMI ET PIENTISSIMI PRINCIPIS GEORGII TERTII. In a glaſs vaſe hermetically ſealed, which is alſo placed in the foundation-ſtone, are depoſited ſpecimens of the different coins of his preſent majeſty.

The front of the building directly faces the bridge, extends from eaſt to weſt 200 feet, and is 40 feet back from the line of Prince's-ſtreet. In the middle of the front is a ſmall projection of three windows in breadth. Here is a pediment, having in its centre the arms of Great Britain, and the whole is ſupported by four Corinthian pilaſters. At each end is a tower projecting beyond the reſt of the building, having a Venetian window in front, and a cupola on the top. The front is ornamented from end to end with a beautiful Corinthian entablature. In the centre of the building is a dome of wooden work covered with lead. The inſide forms a ſaloon 50 feet diameter, and 80 high, lighted at top by a copper window 15 feet in diameter. The whole number of apartments is 97; all of which are vaulted beneath, and warmed with fire-places. The building is executed according to a plan of Mr Adams architect; and when finiſhed, may vie with any modern building whatſoever. The whole expence is eſtimated at 25,000l.

12. *The Theatre.* Entertainments of the dramatic kind came very early into faſhion in this country. They were at firſt only repreſentations of religious ſubjects, and peculiarly deſigned to advance the intereſts of religion; the clergy being the compoſers, and Sunday the principal time of exhibition. In the ſixteenth century, the number of play-houſes was ſo great, that it was complained of as a nuiſance, not only in Edinburgh, but throughout the kingdom. They ſoon degenerated from their original inſtitution; and the plays, inſtead of being calculated to inſpire devotion, became filled with all manner of buffoonery and indecency.—After the reformation, the preſbyterian clergy complained of theſe indecencies; and being actuated by a ſpirit of violent zeal, anathematiſed every kind of theatrical repreſentation whatever. King James VI. compelled them to paſs from their cenſures againſt the ſtage; but, in the time of Charles I. when fanaticiſm was carried to the utmoſt length at which perhaps it was poſſible for it to arrive, it cannot be ſuppoſed that ſtage-plays would be tolerated. On the Reſtoration, when people were ready to fall into the other extreme, ſtage-plays were not only revived, but many improvements made, among which that of introducing women on the ſtage was none of the leaſt.—It ſeems, however, that amuſements of this kind were again introduced at Edinburgh about the year 1684, when the duke of York kept his court there. His reſidence at Edinburgh drew off one half of the London company, and plays were acted in Edinburgh for ſome little time. The misfortunes attending the duke of York, however, and the eſtabliſhment of the preſbyterian religion (the genius of which is unfavourable to amuſements of this kind), ſoon put a ſtop to the progreſs of the ſtage, and no theatrical exhibiton was heard of in Edinburgh till after the year 1715. The firſt adventurer was Signora Violante, an Italian, remarkable for feats of ſtrength, tumbling, &c. In this way ſhe firſt exhibited in a houſe at the foot of Carrubber's cloſe, which has ſince been employed by different ſectaries for religious purpoſes. Meeting with good ſucceſs, ſhe ſoon invited a company of comedians from London; and theſe being alſo well received, Edinburgh continued for ſome years to be entertained with the performances of a ſtrolling company, who viſited it annually. Becoming at laſt,

however, obnoxious to the clergy, they were, in 1727, prohibited by the magiſtrates from acting within their juriſdiction. But this interdict was ſuſpended by the court of ſeſſion, and the players continued to perform as uſual.

Still, however, theatrical entertainments were but rare. The town was viſited by itinerant companies only once in two or three years. They performed in the *Taylor's hall* in the Cowgate; which, when the houſe was full, would have drawn (at the rate of 2s. 6d. for pit and boxes, and 1s. 6d. for the gallery) 40l. or 45l. a night. About this time an act of parliament was paſſed, prohibiting the exhibition of plays, except in a houſe licenſed by the king. Of this the preſbytery of Edinburgh immediately laid hold; and at their own expence brought an action on the ſtatute againſt the players. The cauſe was, by the court of ſeſſion, decided againſt the players; who thereupon applied to parliament for a bill to enable his majeſty to licenſe a theatre in Edinburgh. Againſt this bill, petitions were preſented, in 1739, to the houſe of commons, by the magiſtrates and town-council, the principal and profeſſors of the univerſity, and the dean of guild and his council; in conſequence of which, the affair was dropped. All this oppoſition, however, contributed in reality to the ſucceſs of the players; for the ſpirit of party being excited, a way of evading the act was eaſily found out, and the houſe was frequented more than uſual, inſomuch that Taylor's-hall was found inſufficient to contain the number of ſpectators.

The comedians now fell out among themſelves, and a new play-houſe was erected in the Canongate in the year 1746. The conſequence of this was, that the old one in Taylor's-hall became entirely deſerted, and through bad conduct the managers of the new theatre ſoon found themſelves greatly involved: at laſt, a riot enſuing, through diſſenſions among the performers, the play-houſe was totally demoliſhed.---When the extenſion of the royalty, over the ſpot where the new town is built, was obtained, a clauſe was likewiſe added to the bill, enabling his majeſty to licenſe a theatre in Edinburgh. This was obtained, and thus the oppoſition of the clergy for ever ſilenced: but the ſucceſs of the theatre has not been great; nor is it at preſent on a reſpectable footing, moſtly owing to the embaraſſed circumſtances of the managers; who, paying no leſs than 500 guineas per annum to Mr Roſs the patentee, are unable to decorate the theatre as it ought to be, to retain good actors, or to provide a ſuitable wardrobe.---The Edinburgh theatre, internally, is ſimple, commodious, and elegant: externally, it hath neither beauty nor elegance; and is ſituated in ſuch a manner as to obſtruct the view of the regiſter-office, which is, without exception, the handſomeſt building about Edinburgh.

13. *The Concert-Hall* is ſituated in Niddry's-wynd, a centrical part of the town, and was built in 1762. The plan was drawn by Sir Robert Mylne (architect of Blackfriars bridge), after the model of the great opera theatre at Parma. The muſical room is of an oval form, the ceiling being a concave elliptical dome, lighted from the top by a lanthorn. The ſeats are ranged in the form of an amphitheatre; and are capable of containing 500 perſons, beſides leaving a large area in the middle of the room. The orcheſtra is at the upper end, and is terminated by an elegant organ.

The muſical ſociety was firſt inſtituted in the year 1728. Before that time, ſeveral gentlemen had formed a weekly club at a tavern kept by one Steil, a great lover of muſic, and a good ſinger of Scots ſongs. Here the common entertainment conſiſted in playing on the harpſichord and violin the concertos and ſonatas of Handel, juſt then publiſhed.—The meeting, however, ſoon becoming numerous, they inſtituted, in the year above-mentioned, a ſociety of 70 members, for the purpoſe of holding a weekly concert. The affairs of the ſociety are regulated by a governor, deputy-governor, treaſurer, and five directors, who are annually choſen by the members. The meetings have been continued ever ſince that time on much the ſame footing as at firſt, and the number of members is now increaſed to 200.

14. *The Church of St Giles* is a beautiful Gothic building, meaſuring in length 206 feet. At the weſt end, its breadth is 110; in the middle, 129; and at the eaſt end, 76 feet. It has a very elevated ſituation, and is adorned with a lofty ſquare tower, encircled at top with ornaments of open figured ſtone-work, like thoſe that adorn the circlet of an imperial crown. From the ſides and corners of the tower, riſe arches of ſtone-work; which, meeting with each other in the middle, complete the figure of an imperial crown, the top of which terminates in a pointed ſpire. The whole height of this tower is 161 feet.

This is the moſt ancient church in Edinburgh. From a paſſage in an old author called *Simeon Dunelmenſis*, ſome conjecture it to have been built before the year 854; but we do not find expreſs mention made of it before 1359. The tutelar ſaint of this church, and of Edinburgh, was St Giles, a native of Greece. He lived in the ſixth century, and was deſcended of an illuſtrious family. On the death of of his parents, he gave all his eſtate to the poor; and travelled into France, where he retired into a wilderneſs near the conflux of the Rhone with the ſea, and continued there three years. Having obtained the reputation of extraordinary ſanctity, various miracles were attributed to him; and he founded a monaſtery in Languedoc, known long after by the name of *St Giles's*.---In the reign of James II. Mr Preſton of Gorton, a gentleman whoſe deſcendents ſtill poſſeſs an eſtate in the county of Edinburgh, got poſſeſſion of the arm of this ſaint; and the relique he bequeathed to the church of Edinburgh. In gratitude for this donation, the magiſtrates granted a charter in favour of Mr Preſton's heirs, by which the neareſt heir of the name of Preſton was entitled to carry it in all proceſſions. At the ſame time, the magiſtrates obliged themſelves to found an altar in the church of St Giles's, and appoint a chaplain for celebrating an annual maſs for the ſoul of Mr Preſton; and likewiſe, that a tablet, containing his arms, and an account of his pious donation, ſhould be put up in the chapel.---St Giles's was firſt ſimply a pariſh-church, of which the biſhop of Lindiſfarn, or Holy Iſland, in the county of Northumberland, was patron. He was ſucceeded in the patronage by the abbot and canons of Dunfermline, and they by the magiſtrates of Edinburgh. In 1466, it was erected into a collegiate church by James III.---At the Reformation, the church was, for the greater convenience, divided into ſeveral parts. The four principal ones are appropriated to divine worſhip, the leſſer ones to other purpoſes. The chief of theſe diviſions is called the *New Church*. In it are the king's ſeat, thoſe of the provoſt and magiſtrates, &c. At the ſame time alſo, the religious utenſils belonging to this church were ſeized by the magiſtrates. They were,—St Giles's arm, enſhrined in ſilver, weighing five pounds three ounces and an half; a ſilver chalice, or communion-cup, weighing 23 ounces; the great *euchariſt* or communion cup, with *golden weike and ſtones*; two cruets of 25 ounces; a golden bell, with a heart of four ounces and a half; a golden unicorn; a golden pix, to keep the hoſt; a ſmall golden heart, with two pearls; a diamond ring; a ſilver chalice, patine, and ſpoon, of 32 ounces and a half; a communion table-cloth of gold brocade; *St Giles's coat*, with a little piece of red velvet which hung at his feet; a round ſilver *euchariſt*; two ſilver cenſers, of three pounds fifteen ounces; a ſilver ſhip for incenſe; a large ſilver croſs, with its baſe, weighing ſixteen pounds thirteen ounces and a half; a triangular ſilver lamp; two ſilver candleſticks, of ſeven pounds three ounces; other two, of eight pounds thirteen ounces; a ſilver chalice gilt, of 20½ ounces; a ſilver chalice and croſs, of 75 ounces; beſides the prieſts robes, and other veſtments, of gold brocade, crimſon velvet embroidered with gold, and green damaſk.---Theſe were all ſold, and part of the money applied to the repairs of the church; the reſt was added to the funds of the corporation.---The other preſbyterian churches in Edinburgh are, the Trinity-college church; the Old and New Gray-friars; the Tron-church; Lady Yeſter's; Canongate; St Cuthbert's; Chapel of Eaſe; Lady Glenorchy's; and the Earſe church.

15. *The Engliſh Chapel.* This building ſtands near the Cowgate-port, and was begun on the 3d of April 1771. The foundation-ſtone was laid by general Oughton, with the following inſcription: “Edificii ſacr. Eccleſiæ Epiſc. Angliæ, primum poſuit lapidem, J. Adolphus Oughton, in architectonicæ Scotiæ repub. Curio maximus, militum præfectus, regnante Georgio III. tertio Apr. die A. D. MDCCLXXI.”---It is a plain, handſome building, neatly fitted up in the inſide, and reſembling in form the church of St Martin's in the Fields, London. It is 90 feet long, 75 broad, and ornamented with a neat ſpire of a conſiderable height. The ſpire is furniſhed with an excellent bell, formerly belonging to the chapel-royal at Holyrood-houſe. This is permitted to be rung for aſſembling the congregation; an indulgence which is not granted to the preſbyterians in England. This building has already coſt 6000l. beſides 800l. for the area: It ſtill wants two porticoes; one of which, on the ſouth, is meant to conſiſt of lofty Corinthian pillars, ſupporting a pediment; and the expences of theſe are eſtimated at 1000l. more.

Beſides the above-mentioned places appointed for religious worſhip, there were formerly a number of others, which are now either diſuſed, or entirely ruined. The principal of theſe are,

16. *Church of St Mary in the field, and Monaſtery of Black-friars.*---The church of St Mary was a large handſome building, in which a provoſt and ten prebendaries officiated. It is probable, that both the church and convent were founded in the reign of Alexander II. in 1230. The convent was built almoſt on the ſame ſpot where the high-ſchool ſtands at preſent. The church ſtood where the college does now. The convent and church, with the houſes of the provoſt and prebendaries, occupied almoſt all the ſpace between the Cowgate and Potterrow. The lane, now called *Black-friar's wynd*, was alſo the property of theſe eccleſiaſtics, and took its name from them. The monaſtery was burned down in 1528, but was rebuilt at the Reformation; ſoon after which, the eccleſiaſtics were ſtripped of all their poſſeſſions. The magiſtrates obtained them from James VI.; and were alſo impowered to diſpoſe of them, and apply the feu-duties towards building and endowing an hoſpital at Trinity-college church. The lands formerly belonging to this church of St Mary, and monaſtery of Black-friars, are now chiefly occupied by the college, high-ſchool, church of Lady Yeſter, royal infirmary, and ſurgeons-hall.

17. *St Mary's Chapel.* This chapel was founded by Elizabeth counteſs of Roſs in 1505, and ſtands near the middle of Niddry's wynd. It was dedicated “To God, and the Virgin Mary his mother.” About the year 1600, one Chalmers, a macer before the court of ſeſſion, acquired a right to this chapel; and, in 1618, the corporations of wrights and maſons, now known by the name of the “United Incorporations of Mary's Chapel,” purchaſed the ſubject which they ſtill poſſeſs, and where they hold the meetings of the corporations.

18. *Hoſpital of our Lady.* This was founded, near the foot of Leith wynd, in 1479, by Thomas Spens biſhop of Aberdeen, for the maintenance of 12 poor men. Theſe poor men, however, muſt certainly have been maintained by the contributions of the public; for the rents with which the hoſpital was endowed, did not exceed 12l. ſterling. At the Reformation, the town-council of Edinburgh became proprietors of this hoſpital. In 1619, it was converted into a work-houſe, and had the name of *Paul's work* beſtowed upon it, which name it ſtill retains.---At the ſame time, the council brought five men from Holland to inſtruct indigent boys and girls in the manufacture of coarſe woollen ſtuffs. The manufacture, however, did not ſucceed; upon which it was converted into a *correction-houſe*. At laſt it was ſold to one Mr M‘Dowal, who carries on in it a conſiderable manufacture of broad cloths.

19. *St Thomas's Hoſpital* was founded by George Creichton biſhop of Dunkeld, in the reign of James V. The building joined immediately to the Water-gate upon the weſt. It was dedicated to God, the Virgin Mary, and all the ſaints. Among the charitable purpoſes for which it was inſtituted, one was, That prayers might be ſaid in it for the ſoul of the founder, and of the king of the Scots, as well as ſome other perſons mentioned in the inſtitution. The patronage was veſted in the founder himſelf, and a certain number of his heirs named by him. In 1617, the hoſpital was diſpoſed of by the chaplains and beadſmen, with conſent of the patron, to the bailies of the Canongate, to be uſed as an hoſpital for the poor of that diſtrict. In 1634, the patronage was ſold to the kirk-ſeſſion; but ſtill with a view to the ſame charitable purpoſes. By degrees, the revenues of it came to be entirely embezzled. In 1747, the building was converted into coach-houſes; and, in 1778, having become ruinous, it was entirely pulled down, and rebuilt as private houſes.

20. *Monaſtery of St Catherine of Sienna.* This lay on the ſouth ſide of the meadows, and was founded by lady St Clair of Roſlin. It was a monaſtery of Dominican nuns; but, at the Reformation, the magiſtrates ſeized the revenues of the monaſtery, and cruelly turned out the poor women to the wide world; nor would they, till compelled by queen Mary, allow them the ſmalleſt ſubſiſtence even out of their own funds. The neighbourhood of this monaſtery is now called *the Sheens;* probably a corruption of the word *Sienna.*

21. *Chapels of St Leonards, and St Mary of Placentia.* The firſt of theſe ſtood on the eaſt ſide of the road to Dalkeith. The lands belonging to it were, by king James VI. granted to the magiſtrates of the Canongate for the ſupport of Thomas's hoſpital. The land in its neighbourhood ſtill bears the name of *St Leonard's hill.* A part of it belongs to the quakers, who uſe it for a burying ground; another part is uſed for burying children who have died without baptiſm, and perſons who have put an end to their own life.—Nigher to the city, at a ſmall diſtance from the ſouth-eaſt angle of the town-wall, ſtood a priory of nuns dedicated to *St Mary of Placentia.* This ſtreet ſtill bears the name of the *Pleaſants*, or *Pleaſance;* probably corrupted from *Placentia.*

22. *Monaſtery of Holy-rood Houſe.* This was founded by king David I. in 1128, and called *Holy-rood Houſe*, in memory, as is ſaid, of his deliverance from an enraged hart, by the miraculous interpoſition of a croſs from heaven. This monaſtery he gave to the canons regular of St Auguſtine; on whom he alſo beſtowed the church of Edinburgh caſtle, with thoſe of St Cuthbert's, Corſtorphin, and Libberton, in the ſhire of Mid-Lothian, and of Airth in Stirlingſhire; the priories of St Mary's iſle in Galloway, of Blantyre in Clydeſdale, of Rowadill in Roſs, and three others in the Weſtern Iſles. To them he alſo granted the privilege of erecting a borough between the town of Edinburgh and the church of Holy-rood Houſe. From theſe canons it had the name of the *Canongate*, which it ſtill retains. In this new borough they had a right to hold markets. They had alſo portions of land in different parts, with a moſt extenſive juriſdiction, and right of trial by duel, and fire and water ordeal. They had alſo certain revenues payable out of the exchequer, and out of other funds, with fiſhings, and the privilege of erecting mills on the water of Leith, which ſtill retain the name of *Canon-mills.* Other grants and privileges were beſtowed by ſucceeding ſovereigns; ſo that it was deemed the richeſt religious foundation in Scotland. At the Reformation, its annual revenues were, 442 bolls of wheat, 640 bolls of bear, 560 bolls of oats, 500 capons, two dozen of hens, as many ſalmon, 12 loads of ſalt; beſides a great number of ſwine, and about 250l. ſterling in money. At the Reformation, the ſuperiority of North Leith, part of the Pleaſance, the barony of Broughton, and the Canongate, was veſted in the earl of Roxburgh; and were purchaſed from him by the town-council of Edinburgh in 1636. In 1544, the church ſuffered conſiderably by the invaſion of the Engliſh; but was ſpeedily repaired. At the Reſtoration, king Charles II. ordered the church to be ſet apart as a chapel-royal, and prohibited its uſe as a common pariſh-church for the future. It was then fitted up in a very elegant manner. A throne was erected for the ſovereign, and 12 ſtalls for the knights of the order of the thiſtle; but as maſs had been celebrated in it in the reign of James VII. and it had an organ, the preſbyterians, at the revolution, entirely deſtroyed its ornaments, and left nothing but the bare walls.—Through time, the roof of the church became ruinous; on which the duke of Hamilton repreſented its condition to the barons of exchequer, and craved that it might be repaired. This requeſt was complied with: but the architect and maſon who were employed, covered the roof with thick flag-ſtones, which ſoon impaired the fabric; and on the 2d of December 1768, the roof of the church fell in. Since that time, no attempt has been made to repair it, and it is now entirely fallen to ruin.

23. *The Obſervatory.* The ſcheme of building an obſervatory was firſt adopted in the year 1736; but the diſturbance occaſioned by the Porteous mob, prevented any thing from being done towards the execution of it at that time. The earl of Morton afterwards gave 100l. for the purpoſe of building an obſervatory, and appointed Mr M'Laurin profeſſor of mathematics, together with the principal and ſome profeſſors of the univerſity, truſtees for managing the ſum. Mr M'Laurin added to the money above-mentioned, the profits ariſing from a courſe of lectures which he read on experimental philoſophy, which, with ſome other ſmall ſums, amounted in all to 300l.; but Mr M'Laurin dying, the deſign was dropped.---Afterwards the money was put into the hands of two perſons who became bankrupt; but a conſiderable dividend being obtained out of their effects, the principal and intereſt, about the year 1776, amounted to 400l. A plan of the building was made out by Mr Craig architect; and the foundation-ſtone was laid by Mr Stodart, lord provoſt of Edinburgh, on the 25th of Auguſt 1776. About this time, however, Mr Adam architect happening to come to Edinburgh, conceived the idea of giving the whole the appearance of a fortification, for which its ſituation on the top of the Calton-hill was very much adapted. Accordingly a line was marked out for incloſing the limits of the obſervatory with a wall conſtructed with buttreſſes and embraſures, and having Gothic towers at the angles. Thus the money deſigned for the work was totally exhauſted, and the obſervatory ſtill remains unfiniſhed; nor is there any appearance of its being ſoon completed, either by voluntary ſubſcription, or any other way.

24. *The College* was founded in 1581; the town-council having at that time got a legacy of 8000 merks, left for this purpoſe by Robert Reid biſhop of Orkney. James VI. endowed it with certain church-lands in the counties of Lothian and Fife; and, conſidering himſelf as its patron, ordered it to be called *King James's college.* From time to time it has received many donations from well diſpoſed people.—In this univerſity all the different branches of medicine, as well as of theology, law, &c. are taught in the moſt perfect manner. The firſt medical profeſſors inſtituted at Edinburgh, were Sir Robert Sibbald and Doctor Archibald Pitcairn, in the year 1685 *. Theſe, however, were only titular profeſſors. The college of phyſicians, although they poſſeſſed an excluſive right of *practiſing*, were debarred from *teaching* in Edinburgh; and for 30 years afterwards, a ſummer-lecture on

* See College of *Phyſicians.*

on the officinal plants, and the diſſection of a human body once in two or three years, completed the whole courſe of medical education at Edinburgh.---In 1720, an attempt was made to teach the different branches of phyſic regularly; which ſucceeded ſo well, that, ever ſince, the reputation of the univerſity, as a ſchool for medicine, hath been conſtantly increaſing, both in the iſland of Britain, and even among diſtant nations.---The medical claſſes are opened on the laſt Wedneſday of November; and from that time to the beginning of May, five lectures are given weekly by each profeſſor, Chriſtmas week only excepted.---The following is a liſt of the preſent profeſſors in the univerſity of Edinburgh, with the ſalary belonging to each.

	L.	s.	d.
THEOLOGY.			
William Robertſon, D. D. principal of the univerſity, and primary profeſſor of divinity.	111	2	$0\frac{2}{3}$
Robert Hamilton, D. D. profeſſor of divinity.	161	2	$0\frac{2}{3}$
Robert Cuming, *regius* profeſſor of divinity and church-hiſtory	100	0	0
James Robertſon, D. D. profeſſor of Oriental languages, librarian, and ſecretary to the univerſity.	119	12	8
LAW.			
James Balfour, advocate, *regius* profeſſor of the law of nature and nations	200	0	0
Robert Dick, advocate, profeſſor of civil law	100	0	0
William Wallace, advocate, profeſſor of Scots law	100	0	0
John Pringle, advocate, profeſſor of civil hiſtory, and Greek and Roman antiquities	100	0	0
MEDICINE.			
Alexander Monro, profeſſor of anatomy and ſurgery	50	0	0
William Cullen, M. D. profeſſor of the practice of medicine	0	0	0
John Hope, M. D. *regius* profeſſor of botany	77	15	$6\frac{2}{3}$
Francis Home, M. D. profeſſor of materia medica	0	0	0
Joſeph Black, M. D. profeſſor of chemiſtry	0	0	0
James Gregory, M. D. profeſſor of the theory of medicine, and dean of the faculty of medicine	0	0	0
Thomas Young, M. D. profeſſor of midwifery	0	0	0
Profeſſor of natural hiſtory	70	0	0
ARTS.			
Adam Ferguſon, L. L. D. profeſſor of moral philoſophy	102	4	$5\frac{1}{3}$
Hugh Blair, D. D. *regius* profeſſor of rhetoric and belles lettres	70	0	0
Andrew Dalziell, M. A. profeſſor of Greek	52	4	$5\frac{1}{3}$
John Hill, M. A. profeſſor of humanity	52	10	0
John Robiſon, M. A. profeſſor of natural philoſophy	52	4	$5\frac{1}{3}$
Dugald Stewart, M. A. profeſſor of mathematics and aſtronomy	113	6	$5\frac{1}{3}$
John Bruce, M. A. profeſſor of Logic, and dean of the faculty of arts	52	4	8

N. B. The ſalary of the king's phyſician is divided among thoſe gentlemen who have no ſalaries as profeſſors.

The college is endowed with a very fine library. It was founded in 1580 by Mr Clement Little, advocate, who bequeathed it to the town-council. They ordered a houſe to be built for it in the neighbourhood of St Giles's church, where it was for ſome time kept under the care of the eldeſt miniſter of Edinburgh, but was afterwards removed to the college. This collection is enriched, as well as others of a ſimilar kind, by receiving a copy of every book entered in Stationer's hall, according to the ſtatute for the encouragement of authors. Beſides this, the only fund it has is the money paid by all the ſtudents at the univerſity, except thoſe of divinity, upon their being matriculated; and a ſum of 5 l. given by each profeſſor at his admiſſion. The amount of theſe ſums is uncertain.

The advocates library is a better collection than the former. It was founded, in 1682, by Sir George Mackenzie, lord advocate. Beſides 30,000 printed volumes in all languages, here are alſo a very valuable collection of manuſcripts of different kinds, prints, medals, coins, &c. The faculty have alſo in their poſſeſſion an entire mummy, preſerved in its original cheſt. This was preſented by the earl of Morton, who bought it at the price of 300 l.

25. *The High School.* The earlieſt inſtitution of a grammar-ſchool in Edinburgh ſeems to have been about the year 1519. The whole expence beſtowed upon the firſt building of this kind amounted only to about 40 l. Sterling. Another building, which had been erected for the accommodation of the ſcholars in 1578, continued, notwithſtanding the great increaſe of their number, to be uſed for that purpoſe till 1777. The foundation of the preſent new building was laid on the 24th of June that year by Sir William Forbes, Grand Maſter of the Free Maſons. The total length of this building is 120 feet from ſouth to north; the breadth in the middle 36, at each end 38 feet. The great, hall where the boys meet for prayers, is 68 feet by 30. At each end of the hall is a room of 32 feet by 20, intended for libraries. The building is two ſtories high, the one 18, the other 17, feet in height. The expence of the whole when finiſhed is reckoned at 3000 l.

26. *The exchange.* The foundation of this building was laid by Provoſt Drummond on the 13th of September 1753. It is a large and elegant building, of a ſquare figure, with a court in the centre. The principal part forms the north ſide of the ſquare, and extends 111 feet in length, and 51 in breadth. Pillars and arches ſupporting a platform run along the ſouth front which faces the ſquare, and forms a piazza. In the centre, four Corinthian pillars, whoſe baſes reſt upon the platform, ſupport a pediment on which the arms of the city are engraved. This building on the ſouth ſide is 60 feet high; but on the north, upwards of 100; owing to the extreme inequality of the ground on which it is built. The whole expence amounted to 31,457 l.

19
Politic
Conſti
tion.

With regard to the political conſtitution of Edinburgh, the town-council have the direction of all public affairs. The *ordinary* council conſiſts only of 25 perſons; but the *council ordinary and extraordinary*, of 33. The whole is compoſed of merchants and tradeſmen, whoſe reſpective powers and intereſts are ſo interwoven, that a balance is preſerved between the two bodies. The members of the town-council are partly elected by the members of the 14 incorporations, and they partly chooſe their own ſucceſſors. The election is made in the following manner. Firſt, a liſt or *leet* of ſix perſons is made out by each incorporation; from which number, the deacon belonging to that incorporation muſt be choſen. Theſe liſts are then laid before the ordinary council of 25, who "ſhorten the *leets*," by expunging one half of the names from each; and from the three remaining ones the deacon is to be choſen. When this election is over, the new deacons are preſented to the ordinary council, who chooſe ſix of them to be members of their body, and the ſix deacons of laſt year then walk off. The council of 25 next proceed to the election of three merchant and two trades counſellors. The members of council, who now amount to 30 in number, then make out *leets*, from which the lord provoſt, dean of guild, treaſurer, and bailies, muſt be choſen. The candidates for each of theſe offices are three in number; and the election is made by the 30 members of council already mentioned, joined to the eight *extraordinary* council-deacons.

The lord provoſt of Edinburgh is high ſheriff, coroner, and admiral, within the city and liberties, and the town, harbour, and road of Leith. He has alſo a juriſdiction in matters of life and death. He is preſes of the convention of royal boroughs. Colonel of the trained bands, commander of the city-guard, and of Edinburgh jail. In the city he has the precedency of all the great officers of ſtate, and of the nobility; walking on the right hand of the king, or of his majeſty's commiſſioner; and has the privilege of having a ſword and mace carried before him. Formerly he was alſo an officer in the Scots parliament. The magiſtrates are ſheriffs-depute and juſtices of the peace; and the town-council are patrons of all the churches in Edinburgh, patrons of the univerſity, and electors of the city's repreſentative in parliament; and have the right of preſenting to all offices of truſt, honour, or profit, belonging to the city. They have beſides a very ample juriſdiction both civil and criminal. The town-council are ſuperiors of the Canongate, Portſborough, and Leith; and appoint over theſe certain of their own number, who are called *baron bailies:* but the perſon who preſides over Leith has the title of *admiral*, becauſe he hath there a juriſdiction over maritime affairs. The baron-bailies appoint one or two of the inhabitants of their reſpective diſtricts to be their ſubſtitutes, and theſe are called *reſident bailies*. They hold courts in abſence of the baron-bailies, for petty offences, and diſcuſſing civil cauſes of little moment.

No city in the world affords greater ſecurity to the inhabitants in their perſons and properties, than Edinburgh. Robberies are here very rare, and a ſtreet-murder is unknown in the memory of man, ſo that a perſon may walk the ſtreets at any hour of the night in perfect ſecurity. This is in a great meaſure owing to the *town-guard*. This inſtitution originated from the conſternation into which the citizens were thrown after the battle at Flowden. At that time, the town-council commanded the inhabitants to aſſemble in defence of the city, and every fourth man to be on duty each night. This introduced a kind of perſonal duty for the defence of the town, called *watching* and *warding;* by which the trading part of the inhabitants were obliged in perſon to watch alternately, in order to prevent or ſuppreſs occaſional diſturbances. This, however, becoming in time extremely inconvenient, the town-council, in 1648, appointed a body of 60 men to be raiſed; the captain of which was to have a monthly pay of 11 l. 2 s. 3 d. two lieutenants of 2 l. each, two ſerjeants of 1 l. 5 s. and the private men of 15 s. each. No regular fund, however, was eſtabliſhed for defraying this expence; the conſequence of which was, that the old method of watching and warding was reſumed: but the people on whom this ſervice devolved, were now become ſo relaxed in their diſcipline, that the magiſtrates were threatened with having the king's troops quartered in the city if they did not appoint a ſufficient guard. On this, 40 men were raiſed in 1679, and in 1682 the number was increaſed to 108. After the revolution, the town-council complained of the guard as a grievance, and requeſted parliament that it might be removed. Their requeſt was immediately granted, and the old method of watching and warding was renewed. This, however, was now ſo intolerable, that the very next year they applied to parliament for leave to raiſe 126 men for the defence of the city, and to tax the citizens for their payment. This being granted, the corps was raiſed, which ſtill continues under the name of the *town-guard*. The number of private men is about 75. They are paid chiefly by a tax on the trading people; theſe being the only perſons formerly ſubject to watching and warding. This tax, however, amounts only to 1250 l. and as the expence of the guard amounts to 1400 l. the magiſtrates are obliged to defray the additional charge by other means.

20 Number of inhabitants.

The number of inhabitants in the city of Edinburgh is ſomewhat uncertain, and has been very variouſly calculated. By a ſurvey made in the year 1775, it appears that the number of families in the city, Canongate and other ſuburbs, and the town of Leith, amounted to 13,806. The difficulty therefore is to fix the number of perſons in a family. Dr Price fixes this number at $4\frac{1}{10}$; Mr Maitland, at $5\frac{1}{2}$; and Mr Arnot, at 6: ſo that, according to this laſt gentleman, the whole number of inhabitants is 82,836; to which he thinks 1400 more may be added for thoſe in the garriſon, hoſpitals, &c. There are, in Edinburgh, 14 incorporations, capable of chooſing their own deacons, viz. The royal college of ſurgeons; the corporations of goldſmiths, ſkinners, furriers, hammermen, wrights and maſons, taylors, bakers, butchers, ſhoemakers, weavers, waukers, bonnet-makers, and merchant-company. The revenue of the city, ariſing partly from duties of different kinds, and partly from landed property, is eſtimated at about 10,000 l. per annum. As Edinburgh is not properly a ſea-port, it hath never been remarkable for trade. Its principal ſupport ariſes from the ſupreme courts of juſtice, which are held there, and from the college. The exports and imports muſt all go and come by the town of Leith. See the article LEITH.

Editor.

EDITOR, a perſon of learning, who has the care of an impreſſion of any work, particularly that of an ancient author: thus, Eraſmus was a great editor; the Louvain doctors, Scaliger, Petavius, F. Sirmond, biſhop Walton, Mr Hearne, Mr Ruddiman, &c. are likewiſe famous editors.

EDMUND I. and II. See (*Hiſtory of*) ENGLAND.

EDUCATION, the inſtructing children, and youth in general, in ſuch branches of knowledge and polite exerciſes as are ſuitable to their genius and ſtation.

Education is a very extenſive ſubject, that has employed the thoughts and pens of the greateſt men: Locke, the archbiſhop of Cambray, Tanaquil Faber, M. Crouſaz, Rollin, and Rouſſeau, may be conſulted on this head.

The principal aim of parents ſhould be, to know what ſphere of life their children are deſigned to act in; what education is really ſuitable to them; what will be the conſequence of neglecting that; and what chance a ſuperior education will give them, for their advancement in the world. Their chief ſtudy ſhould be to give their children ſuch a degree of knowledge as will qualify them to fill ſome certain poſt or ſtation in life: in ſhort, to fit them for an employment ſuited to their condition and capacity, ſuch as will make them happy in themſelves and uſeful to ſociety.

EDULCORATION, properly ſignifies the rendering ſubſtances more mild. Chemical edulcoration conſiſts almoſt always in taking away acids and other ſaline ſubſtances; and this is effected by waſhing the bodies to which they adhere in a large quantity of water. The waſhing of diaphoretic antimony, powder of algaroth, &c. till the water comes off quite pure and inſipid, are inſtances of chemical edulcoration.—In pharmacy, juleps, potions, and other medicines, are ſaid to be *edulcorated*, by adding ſugar, or ſyrup.

EDWARD, the name of ſeveral kings of England. See (*Hiſtory of*) ENGLAND.

EDWARDS (George), fellow of the royal and antiquarian ſocieties, was born at Stratford, a hamlet belonging to Weſtham in Eſſex, on the 3^{d} of April 1694. After having ſpent ſome time at ſchool, he was put apprentice to a tradeſman in Fenchurch-Street. His maſter, who was eminent both for his piety and ſkill in the languages, treated him with great kindneſs; but about the middle of his apprenticeſhip, an accident happened which totally put a ſtop to the hopes of young Edwards's advancing himſelf in the way of trade. Dr Nicolas, a perſon of eminence in the phyſical world, and a relation of his maſter's, happened to die. The Doctor's books were removed to an apartment occupied by Edwards, who eagerly employed all his leiſure-hours, both in the day and great part of the night, in peruſing thoſe which treated of natural hiſtory, ſculpture, painting, aſtronomy, and antiquities. The reading of theſe books entirely deprived him of any inclination for mercantile buſineſs he might have formerly had, and he reſolved to travel into foreign countries. In 1716, he viſited moſt of the principal towns in Holland, and in about a month returned to England. Two years after, he took a voyage to Norway, at the invitation of a gentleman who was diſpoſed to be his friend, and who was nephew to the maſter of the ſhip in which he embarked. At this time Charles XII. was beſieging Frederickſhall; by which means our young naturaliſt was hindered from making ſuch excurſions into the country as otherwiſe he would have done, for the Swedes were very careful to confine ſuch ſtrangers as could not give a good account of themſelves. But notwithſtanding all his precaution, he was confined by the Daniſh guard, who ſuppoſed him to be a ſpy employed by the enemy to get intelligence of their deſigns. However, by obtaining teſtimonials of his innocence, a releaſe was granted.

In 1718 he returned to England, and next year viſited Paris by the way of Dieppe. During his ſtay in this country he made two journeys of 100 miles each; the firſt to Chalons in Champagne, in May 1720; the ſecond on foot, to Orleans and Blois: but an edict happening at that time to be iſſued for ſecuring vagrants, in order to tranſport themſelves to America, as the banks of the Miſſiſippi wanted population; our author narrowly eſcaped a weſtern voyage.

On his arrival in England, Mr Edwards cloſely purſued his favourite ſtudy of natural hiſtory, applying himſelf to drawing and colouring ſuch animals as fell under his notice. A ſtrict attention to natural, more than pictureſque beauty, claimed his earlieſt care: birds firſt engaged his particular attention; and, having purchaſed ſome of the beſt pictures of theſe ſubjects, he was induced to make a few drawings of his own; which were admired by the curious, who encouraged our young naturaliſt to proceed, by paying a good price for his early labours.

Among his firſt patrons and benefactors may be mentioned James Theobalds, Eſq; of Lambeth; a gentleman zealous for the promotion of ſcience. Our artiſt, thus unexpectedly encouraged, increaſed in ſkill and aſſiduity; and procured, by his application to his favourite purſuit, a decent ſubſiſtence, and a large acquaintance. However, he remitted his induſtry in 1731; when, in company with two of his relations, he made an excurſion to Holland and Brabant, where he collected ſeveral ſcarce books and prints, and had an opportunity of examining the original pictures of ſeveral great maſters at Antwerp, Bruſſels, Utrecht, and other cities.

In December 1733, by the recommendation of the great Sir Hans Sloane, Bart. preſident of the college of phyſicians, he was choſen librarian, and had apartments in the college. This office was peculiarly agreeable to his taſte and inclination, as he had the opportunity of a conſtant recourſe to a valuable library, filled with ſcarce and curious books on the ſubjects of natural hiſtory, which he ſo aſſiduouſly ſtudied. By degrees he became one of the moſt eminent ornithologiſts in this or any other country. His merit is ſo well known in this reſpect, as to render any eulogium on his performances unneceſſary: but it may be obſerved, that he never truſted to others what he could perform himſelf; and often found it ſo difficult to give ſatisfaction to his own mind, that he frequently made three or four drawings to delineate the object in its moſt lively character, attitude, and repreſentation.

In 1743, the firſt volume of the Hiſtory of Birds was publiſhed in quarto. His ſubſcribers exceeding even his moſt ſanguine expectations, a ſecond volume appeared in 1747. The third volume was publiſhed in 1750. In 1751, the fourth volume came from the preſs. This volume being the laſt he intended to publiſh at that time, he ſeems to have conſidered it as the moſt perfect of his productions in natural hiſtory; and therefore devoutly offered it up to the great God of nature, in humble gratitude for all the good things he had received from him in this world.

Our author, in 1758, continued his labours under a new title, viz. *Gleanings of Natural Hiſtory.* A ſecond volume of the Gleanings was publiſhed in 1760. The third part, which made the ſeventh and laſt volume of his works, appeared in 1764.

Thus our author, after a long ſeries of years, the moſt ſtudious application, and the moſt extenſive correſpondence to every quarter of the world, concluded a work which contains engravings and deſcriptions of more than 600 ſubjects in natural hiſtory, not before deſcribed or delineated. He likewiſe added a general index in French and Engliſh; which was afterwards perfected, with the Linnæan names, by that great naturaliſt Linnæus himſelf, who frequently honoured him with his friendſhip and correſpondence.

Some time after Mr Edwards had been appointed library-keeper to the royal college of phyſicians, he was, on St Andrew's day, in the year 1750, preſented with an honorary compliment by the preſident and council of the royal ſociety, with the gold medal, the donation of Sir Godfrey Copley, Bart. annually given on that day to the author of any new diſcovery in art or nature, in conſideration of his natural hiſtory juſt then completed. A copy of this medal he had afterwards engraved, and placed under the title in the firſt volume of his hiſtory. He was a few years afterwards elected fellow of the royal ſociety, and of the ſociety of antiquaries, London; and alſo a member of many of the academies of ſciences and learning in different parts of Europe. In compliment to theſe honorary diſtinctions from ſuch learned bodies, he preſented elegant coloured copies of all his works, to the royal college of phyſicians, the royal ſociety, the ſociety of antiquarians, and to the Britiſh muſeum; alſo to the royal academy of ſciences at Paris, from whom he received the moſt polite and obliging letter of thanks by their then ſecretary Monſieur Deſouchy.

His collection of drawings, which amounted to upwards of 900, were purchaſed by the earl of Bute. They contain a great number of Britiſh as well as foreign birds, and other animals hitherto not accurately delineated or deſcribed.

After the publication of the laſt work, being arrived at his 70th year, he found his ſight begin to fail, and his hand loſt its wonted ſteadineſs. He retired from public employment to a little houſe which he purchaſed at Plaiſtow; previous to which, he diſpoſed of all the copies, as well as plates, of his works. The converſation of a few ſelect friends, and the peruſal of a few ſelect books, were the amuſement of the evening of his life; and now and then he made an excurſion to ſome of the principal cities in England, particularly to Briſtol, Bath, Exeter, and Norwich.

Some years before his death, the alarming depredations of a cancer, which baffled all the efforts of phyſical ſkill, deprived him of the ſight of one of his eyes: he alſo ſuffered much from the ſtone, a complaint to which at different periods of his life he had been ſubject. Yet it has been remarked, that, in the ſevereſt paroxyſms of miſery, he was ſcarcely known to utter a ſingle complaint.

Having completed his 80th year, emaciated with age and ſickneſs, he died on the 23d of July 1773, deſervedly lamented by a numerous acquaintance.

EEL, in ichthyology, a ſpecies of MURÆNA.

EEL-*Fiſhing.* See BOBBING and SNIGGLING.

The ſilver-eel may be catched with ſeveral ſorts of baits, as powdered-beef, garden-worms, minnows, hens-guts, fiſh-garbage, *&c.* The moſt proper time for taking them is in the night, faſtening your line to the bank-ſides, with your laying-hook in the water: or a line may be thrown with good ſtore of hooks, baited and plumbed, with a float to diſcover where the line lies, that they may be taken up in the morning.

Microſcopic **EELS** *in ſour Paſte.* See ANIMALCULE, nº 8.

EELS *in Vinegar*, are ſimilar to thoſe in ſour paſte. The taſte of vinegar was formerly thought to be occaſioned by the biting of theſe little animals, but that opinion has been long ago exploded. Mentzelius ſays, he has obſerved the actual transformation of theſe little creatures into flies: but as this hath never been obſerved by any other perſon, nor is there an inſtance of ſuch a transformation in any other animalcule, it ſeems probable that Mentzelius hath been miſtaken in his obſervations.

EEL-*Spear*, a forked inſtrument with three or four jagged teeth, uſed for catching of eels: that with the four teeth is beſt, which they ſtrike into the mud at the bottom of the river, and if it ſtrike againſt any eels it never fails to bring them up.

EFFARE', or **EFFRAYE'**, in heraldry, a term applied to a beaſt rearing on its hind-legs, as if it were frighted or provoked.

EFFECT, in a general ſenſe, is that which reſults from, or is produced by, any cauſe. See CAUSE.

EFFERVESCENCE, an inteſtine motion excited betwixt the parts of two bodies of different natures, when they reciprocally diſſolve each other. Efferveſcences are commonly attended with bubbles, vapours, ſmall jets of the liquid, and a hiſſing noiſe; and theſe phenomena are occaſioned by the air which at that time diſengages itſelf. Sometimes alſo they are accompanied with a great degree of heat, the cauſe of which is not ſo well known. See DISSOLUTION.

Formerly the word *fermentation* was alſo applied to efferveſcences; but now that word is confined to the motion naturally excited in animal and vegetable matters, and from which new combinations among their principles take place.

EFFIGY, the portrait, figure, or exact repreſentation of a perſon.

EFFLORESCENCE, among phyſicians, the ſame with exanthema. See EXANTHEMA.

EFFLORESCENCE, in chemiſtry, denotes the formation of a kind of mealy powder on the ſurface of certain bodies. Effloreſcence is occaſioned either by decompoſition or drying. The effloreſcence which happens to cobalt and martial pyrites is of the firſt, and that obſerved on the cryſtals of marine alkali, Glauber's ſalt, &c. of the latter kind. An effloreſcence is ſometimes alſo a ſpecies of cryſtallization, the nature of which is not well underſtood; as, the beautiful vegetations which ſhoot up from vitriolated tartar acidulated either with the vitriolic or nitrous acids, the ſaline ſpiculæ which are obſerved to ſhoot from ſalt butter, &c.

EFFLORESCENTIA, in botany, (from *effloreſco* to bloom); the preciſe time of the year and month in which every plant ſhews its firſt flowers.

Some plants flower twice a-year, as is common between the tropics; others oftener, as the monthly roſe. The former are called by botaniſts *biferæ;* the latter, *multiferæ*.

The time of flowering is determined by the degree of heat which each ſpecies requires. Mezereon and ſnowdrop produce their flowers in February; primroſe, in the beginning of March; the greater number of plants, during the month of May; corn, and other grain, in the beginning of June; the vine, in the middle of the ſame month; ſeveral compound flowers, in the months of July and Auguſt; laſtly, meadow-ſaffron flowers in the month of October, and announces the ſpeedy approach of winter.

Graſs of Parnaſſus always flowers about the time of cutting down the hay; and in Sweden, the different ſpecies of thiſtle, mountain-lettuce, ſuccory, and balſam, ſeldom flower till after the ſummer ſolſtice: the country-men even know, as by a calendar, that the ſolſtice is paſt, when theſe plants begin to produce their flowers.

The temperature of the ſeaſons has a mighty influence both in accelerating and retarding the flowering of plants. All plants are earlier in warm countries: hence ſuch as are cultivated out of their native ſoil, never flower, till the heat of the climate or ſituation into which they are removed, is equal to that under the influence of which they produced flowers in their own country. For this reaſon, all exotics from warm climates are later in this country than many plants which it naturally produces.

In general, we may obſerve, that the plants of the coldeſt countries, and thoſe produced on the mountains in all climates, being of equal temperature, flower about the ſame time, *viz.* during our ſpring in Europe.

Plants that grow betwixt the tropics, and thoſe of temperate climates, flower during our ſummer.

Plants of temperate climates, ſituated under the ſame parallel of latitude with certain parts of Europe, but removed much farther to the weſt, ſuch as Canada, Virginia, and Miſſiſippi, do not produce flowers till autumn.

Plants of temperate climates in the oppoſite hemiſphere to Europe, flower during our winter, which is the ſummer of theſe regions.

Linnæus and Adanſon have given a ſketch of the different times in which plants flower at Upſal and Paris.

EFFLUVIUM, in phyſiology, a term much uſed by philoſophers and phyſicians, to expreſs the minute particles which exhale from moſt, if not all, terreſtrial bodies, in form of inſenſible vapours. See PERSPIRATION, VAPOUR, SMELL, and the *Index ſubjoined to* MEDICINE.

EFFUSION, in a general ſenſe, the pouring out of any thing liquid, and that with ſome violence.

EFT, in zoology, the Engliſh name of the common lizard. See LACERTA.

EGERIA, or ÆGERIA, a nymph held in great veneration by the Romans. Numa Pompilius made the people believe that he had compoſed the laws and religious ceremonies of Rome by her advice and aſſiſtance.

EGG, in phyſiology, a body formed in certain females, in which is contained an embryo or fetus of the ſame ſpecies, under a cortical ſurface or ſhell. The exterior part of an egg is the ſhell; which in a hen, for inſtance, is a white, thin, and friable cortex, including all the other parts. The ſhell becomes more brittle by being expoſed to a dry heat. It is lined every where with a very thin but a pretty tough membrane, which dividing at, or very near, the obtuſe end of the egg, forms a ſmall bag, where only air is contained. In new-laid eggs this follicle appears very little, but becomes larger when the egg is kept.

Within this are contained the albumen or white, and the vitellus or yolk; each of which have their different virtues.

The albumen is a cold, viſcous, white liquor in the egg, different in conſiſtence in its different parts. It is obſerved, that there are two diſtinct albumens, each of which is incloſed in its proper membrane. Of theſe one is very thin and liquid: the other is more denſe and viſcous, and of a ſomewhat whiter colour; but, in old and ſtale eggs, after ſome days incubation, inclining to a yellow. As this ſecond albumen covers the yolk on all ſides, ſo it is itſelf ſurrounded by the other external liquid. The albumen of a fecundated egg, is as ſweet and free from corruption, during all the time of incubation, as it is in new-laid eggs; as is alſo the vitellus. As the eggs of hens conſiſt of two liquors ſeparated one from another; and diſtinguiſhed by two branches of umbilical veins, one of which goes to the vitellus, and the other to the albumen; ſo it is very probable that they are of different natures, and conſequently appointed for different purpoſes.

When the vitellus grows warm with incubation, it becomes more humid, and like melting wax, or fat; whence it takes up more ſpace. For as the fetus increaſes, the albumen inſenſibly waſtes away, and condenſes: the vitellus, on the contrary, ſeems to loſe little or nothing of its bulk when the fetus is perfected, and only appears more liquid and humid when the abdomen of the fetus begins to be formed.

The chick in the egg is firſt nouriſhed by the albumen; and when this is conſumed, by the vitellus, as with milk. If we compare the chalazæ to the extremities of an axis paſſing through the vitellus, which is of a ſpherical form, this ſphere will be compoſed of two unequal portions, its axis not paſſing through its centre; conſequently, ſince it is heavier than the white, its ſmaller portion muſt always be uppermoſt in all poſitions of the egg.

The yellowiſh white round ſpot, called *cicatricula*, is placed on the middle of the ſmaller portion of the yolk; and therefore, from what has been ſaid in the laſt paragraph, muſt always appear on the ſuperior part of the vitellus.

Not long before the excluſion of the chick, the whole yolk is taken into its abdomen; and the ſhell, at the obtuſe end of the egg, frequently appears cracked ſome time before the excluſion of the chick. The chick is ſometimes obſerved to perforate the ſhell with its beak. After excluſion, the yolk is gradually waſted, ed, being conveyed into the ſmall-guts by a ſmall duct.

Eggs differ very much according to the birds that lay them, according to their colour, form, bigneſs, age, and the different way of dreſſing them: thoſe moſt uſed in food are hens eggs; of which, ſuch as are new-laid are beſt.

As to the preſervation of eggs, it is obſerved that the egg is always quite full when it is firſt laid by the hen; but from that time it gradually becomes leſs and leſs ſo, to its decay: and however compact and cloſe its ſhell may appear, it is nevertheleſs perforated with a multitude of ſmall holes, though too minute for the diſcernment of our eyes, the effect of which is a daily decreaſe of matter within the egg, from the time of its being laid; and the perſpiration is much quicker in hot weather than in cold.

To preſerve the egg freſh, there needs no more than to preſerve it full, and ſtop its tranſpiration; the method of doing which is, by ſtopping up thoſe pores with matter which is not ſoluble in watery fluids: and on this principle it is, that all kinds of varniſh, prepared with ſpirit of wine, will preſerve eggs freſh for a long time, if they are carefully rubbed all over the ſhell: tallow, or mutton-fat, is alſo good for this purpoſe; for ſuch as are rubbed over with this, will keep as long as thoſe coated over with varniſh.

For the chemical principles of eggs, and the various uſes to which the eggs themſelves may be applied, ſee the arcles ALBUMEN, VITELLUS, CEMENT, CLARIFICATION, VARNISH, the *Index* ſubjoined to MEDICINE, &c.

Artificial Method of Hatching EGGS. See HATCHING.

EGINA. See ÆGINA.

EGINHART, ſecretary to the emperor Charles the Great, was a German. He is the moſt ancient hiſtorian of that nation, and wrote very eloquently for a man of the 9th century. It is ſaid, that he inſinuated himſelf ſo well into the favour of Imma, daughter to Charles the Great, that he obtained from her whatever he deſired. Charles the Great, having found out the intrigue, did not do as Auguſtus, who is thought to have baniſhed Ovid becauſe he believed him to be too much favoured by Julia; for he married the two lovers together, and gave them a fine eſtate in land.

EGLANTINE, in botany. See ROSA.

EGRA, a town of Bohemia, formerly imperial, but now ſubject to the houſe of Auſtria. It contains a great number of able artificers, and is famous for its mineral waters. Wallenſtein, the emperor's general, was aſſaſſinated here, in 1634. The French became maſters of this town in 1741; but afterwards being blocked up, they were forced to capitulate on September 7th, 1743. It is looked upon as a town of the greateſt conſequence in Bohemia, except Prague. It is ſeated on a river of the ſame name, in E. Long. 12. 30. N. Lat. 50. 21.

EGYPT, an extenſive country of Africa, lying between 30° and 36° of eaſt longitude, and between 21° and 31° of north latitude; and bounded by the Mediterranean on the north; by the Red-ſea and Iſthmus of Suez, which divide it from Arabia, on the eaſt; by Abyſſinia or Ethiopia, on the ſouth; and by the deſarts of Barca and Nubia, on the weſt; being 600 miles in length from north to ſouth, and from 100 to 200 in breadth from eaſt to weſt.

1 Different names.

As a nation, the Egyptians may with juſtice lay claim to as high antiquity as any in the world. The country was moſt probably peopled by Mizraim the ſon of Ham, and grandſon of Noah.—By its ancient inhabitants it was called *Chemia*, and is ſtill called *Chemi* in the language of the *Copts* or native Egyptians; and this name it is ſuppoſed to have received from Ham the ſon of Noah. In ſcripture, we find it moſt generally named *Mizraim;* though in the Pſalms it is ſtyled the *land of Ham*.—To us it is beſt known by the name *Egypt*, the etymology of which is more uncertain.—Some derive it from *Ægyptus*, a ſuppoſed king of the country: others ſay it ſignifies no more than "the land of the *Copts;*" *Aia* in Greek ſignifying a country, and *Æcoptos* being eaſily ſoftened into *Ægyptus*.—The moſt probable opinion, however, ſeems to be, that it received this name from the blackneſs of its ſoil, and the dark colour both of its river and inhabitants: for ſuch a blackiſh colour is by the Greeks called *ægyptios*, from *gyps*, and *ægyps*, a vulture; and by the Latins, *ſubvulturius*. For the ſame reaſon, other names of a ſimilar import have been given to this country by the Greeks; ſuch as *Aeria*, and *Melambolus:* the river itſelf was called *Melo* or *Melas;* by the Hebrews, *Shihor;* and by the Ethiopians, *Siris;* all of which ſignify "black."

Ancient Egypt is by ſome divided into two parts, the upper and lower Egypt: by others into three, the upper Egypt, properly ſo called, or *Thebais;* the middle Egypt, or *Heptanomis;* and the lower Egypt, the beſt part of which was the *Delta*, or that ſpace encompaſſed by the branches of the Nile. See THEBAIS, &c.

The Egyptians, like the Chineſe, pretend to an exceſſive antiquity, pretending to have records for ten, twenty, or even fifty thouſand years. Thus their hiſtory is ſo much involved in obſcurity and fable, that for many ages it muſt be paſſed over in ſilence.---The firſt *mortal* king whom the Egyptians own to have reigned in that country, was *Menes* or *Menas*. At what time he reigned, it would be to very little purpoſe to inquire. He had been preceded, however, by a ſet of *immortals*, who it ſeems left him the kingdom in a very bad ſituation: for the whole country, except Thebais, was a moraſs; the people alſo were entirely deſtitute of religion, and every kind of knowledge which could render their life comfortable and happy. Menes diverted the courſe of the Nile, which before that time had waſhed the foot of a ſandy mountain near the borders of Libya, built the city of Memphis, inſtructed his ſubjects, and did other things of a ſimilar kind which are uſually attributed to the founders of kingdoms.

2 Invaded by the ſhepherds.

From the time of Menes, the Egyptian chronology is filled with a liſt of 330 kings, who reigned 1400 years, but did nothing worthy of notice.—The firſt diſtinct piece of hiſtory we find concerning Egypt, is the irruption of the *Shepherds*, by whom the country was ſubdued; but whether this revolution happened during the vaſt interval of indolence above-mentioned, or before or after, cannot be known. The affair is thus related by Manetho. It happened, in the reign of Timaus king of Egypt, that God being diſpleaſed with the Egyptians, they ſuffered a great revolution: for a multitude of men, ignoble in their race, took courage, and, pouring from the eaſt into Egypt, made war with the inhabitants; who ſubmitted to them without reſiſtance. The ſhepherds, however, behaved with the greateſt cruelty; burnt the cities, threw down the temples of the gods, and put to death the inhabitants, carrying the women and children into captivity. This people came from Arabia, and were called *Hycſos*, or *king-ſhepherds*. They held Egypt in ſubjection for 259 years; at the end of which period, they were obliged by a king of Upper Egypt, named *Aonoſis*, or *Thethmoſis*, to leave the country. This prince's father had, it ſeems, gained great advantages over them, and ſhut them up in a place called *Abaris*, or *Avaris*, containing 10,000 acres of land. Here they were cloſely beſieged by Amoſis, with an army of 400,000 men; but at laſt the king, finding himſelf unable to reduce them by force, propoſed an agreement, which was readily accepted. In conſequence of this agreement, the ſhepherds withdrew from Egypt with their families, to the number of 240,000; and, taking the way of the deſart, entered Syria: but, fearing the Aſſyrians, who were then very powerful, and maſters of Aſia, they entered the land of Judæa, and built there a city capable of holding ſo great a multitude, and called it *Jeruſalem*.

As this account ſeems to bear ſome faint reſemblance to the departure of the Iſraelites under Moſes, ſome chronologers have ſuppoſed them to be the ſame event. This, however, is ſtrenuouſly oppoſed by others; but to decide the queſtion ſeems impoſſible. In theſe early ages, however, it would ſeem that the kingdom of Egypt had been very powerful, and its dominion very widely extended, ſince we find it ſaid, that the *Bactrians* revolted from Oſymandyas another Egyptian king of very high antiquity, and of whoſe wealth the moſt marvellous accounts are given.

After an unknown interval of time from this monarch, reigned Seſoſtris. He was the firſt great warrior whoſe conqueſts are recorded with any degree of diſtinctneſs. In what age of the world he lived, is uncertain. Some chronologers, among whom is Sir Iſaac Newton, are of opinion, that he is the Seſac, or Shiſhak, who took Jeruſalem in the reign of Rehoboam the ſon of Solomon. Others, however, place him much earlier; and Mr Whiſton will have him to be the Pharaoh who refuſed to part with the Iſraelites, and was at laſt drowned in the Red Sea. His reign is reckoned the moſt extraordinary part of the Egyptian hiſtory; and the following ſeems to be the leaſt fabulous account that can be got of it. The father of Seſoſtris was told in a dream, by the god Vulcan, that his ſon, who was then newly born, or perhaps ſtill unborn, ſhould be lord of the whole earth. His father, upon the credit of this viſion, got together all the males in the land of Egypt that were born on the ſame day with Seſoſtris; appointed nurſes and proper perſons to take care of them, and had them treated like his own child; being perſuaded that they who had been the conſtant companions of his youth would prove the moſt faithful miniſters and ſoldiers. As they grew up, they were inured to laborious exerciſes; and, in particular, were never permitted to taſte any food till they had performed a courſe of 180 furlongs, upwards of 22 of our miles. When the old king imagined they were ſufficiently educated in the martial way he deſigned them to follow, they were ſent by way of trial of their abilities againſt the Arabians. In this expedition Seſoſtris proved ſucceſsful, and in the end ſubdued that people who had never before been conquered. He was ſent to the weſtward, and conquered the greateſt part of Africa; nor could he be ſtopped in his career, till he arrived at the Atlantic ocean. Whilſt he was on this expedition, his father died; and then Seſoſtris reſolved to fulfil the prediction of Vulcan, by actually conquering the whole world. As he knew that this muſt take up a long time, he prepared for his journey in the beſt manner poſſible. The kingdom he divided into 36 provinces, and endeavoured to ſecure the affections of the people by gifts both of money and land. He forgave all who had been guilty of high treaſon, and diſcharged the debts of all his ſoldiers. He then conſtituted his brother Arais, the ſupreme regent; but forbad him to uſe the diadem, and commanded him to offer no injury to the queen or her children, and to abſtain from the royal concubines. His army conſiſted of 600,000 foot, 24,000 horſe, and 27,000 chariots. Beſides theſe land-forces, he had at ſea two mighty fleets; one, according to Diodorus, of 400 ſail. Of theſe fleets, one was deſigned to make conqueſts in the weſt, and the other in the eaſt; and therefore the one was built on the Mediterranean, and the other on the Red Sea. The firſt of theſe conquered Cyprus, the coaſt of Phœnicia, and ſeveral of the iſlands called *Cyclades*: the other conquered all the coaſts of the Red Sea; but its progreſs was ſtopped by ſhoals and difficult places which the navigators could not paſs, ſo that he ſeems not to have made many conqueſts by ſea.

With the land-forces Seſoſtris marched againſt the Ethiopians and Troglodites; whom he overcame, and obliged them to pay him a tribute of gold, ebony, and ivory. From thence he proceeded as far as the promontory of Dira, which lay near the ſtraits of Babelmandel, where he ſet up a pillar with an inſcription in ſacred characters. He then marched on to the country where cinnamon grows, or at leaſt to ſome country where cinnamon at that time was brought, probably ſome place in India; and here he in like manner ſet up pillars, which were to be ſeen for many ages after. As to his farther conqueſts, it is agreed by almoſt all authors of antiquity, that he over-ran and pillaged the whole continent of Aſia, and ſome part of Europe. He croſſed the Ganges, and erected pillars on its banks; and from thence he is ſaid to have marched eaſtward to the very extremity of the Aſiatic continent. Returning from thence, he invaded the Scythians and Thracians; but all authors do not agree that he conquered them. Some even affirm, that he was overthrown by them with great ſlaughter, and obliged to abandon a great part of his booty and military ſtores. But, whether he had good or bad ſucceſs in theſe parts, it is a common opinion that he ſettled a colony in Colchis. Herodotus, however, who gives the moſt particular account of the conqueſts of this monarch, does not ſay whether the colony was deſignedly planted by Seſoſtris; or whether part of his army loitered behind the reſt, and took up their reſidence in that region. From his own knowledge, he aſſerts, that the inhabitants of that country were undoubtedly of Egyptian deſcent. This was evident from the perſonal reſemblance they bore to the Egyptians, who were ſwarthy-complexioned and frizzle-haired; but more eſpecially from the conformity of their cuſtoms, particularly circumciſion.

The utmoſt boundary of this mighty monarch's conqueſts, however, was in the country of Thrace; for beyond this country his pillars were no where to be ſeen. Theſe pillars he was accuſtomed to ſet up in every country which he conquered, with the following inſcription, or one to the ſame purpoſe: “Seſoſtris, king of kings, and lord of lords, ſubdued this country by the power of his arms.” Beſides theſe, he left alſo ſtatues of himſelf; two of which, according to Herodotus, were to be ſeen in his time, the one on the road between Epheſus and Phocæa, and the other between Smyrna and Sardis: they were armed after the Ethiopian and Egyptian manner, holding a javelin in one hand, and a bow in the other. Acroſs the breaſt they had a line drawn from one ſhoulder to the other, with the following inſcription; “This region I obtained by theſe my ſhoulders.” They were miſtaken for images of Memnon.

3
Returns to
gypt.

The reaſon given by Seſoſtris for his returning into Egypt from Thrace, and thus leaving the conqueſt of the world unfiniſhed, was, the want of proviſions for his army, and the difficulty of the paſſes. Moſt probably, however, his return was haſtened by the intelligence he received from the high prieſt of Egypt, concerning the rebellious proceedings of his brother; who, encouraged by his long abſence, had aſſumed the diadem, violated the queen, and alſo the royal concubines. On receiving this news, Seſoſtris haſtened from Thrace; and, at the end of nine years, came to Peluſium in Egypt, attended by an innumerable multitude of captives taken from many different nations, and loaded with the ſpoils of Aſia. The treacherous brother met him at this city; and it is ſaid, with very little probability, that Seſoſtris accepted of an invitation to an entertainment from him. At this he drank freely, together with the queen and the reſt of the royal family. During the continuance of the entertainment, Armais cauſed a great quantity of dried reeds to be laid round the apartment where they were to ſleep; and as ſoon as they were retired to reſt, ſet fire to the reeds. Seſoſtris perceiving the danger he was in; and that his guards, overcharged with liquor, were incapable of aſſiſting him; ruſhed through the flames, and was followed by his wife and children. In thankſgiving for this wonderful deliverance, he made ſeveral donations to the gods, particularly to Vulcan the god of fire. He then took vengeance on his brother Armais, ſaid to be the Danaus of the Greeks, who, being on this occaſion driven out of Egypt, withdrew into Greece.

4
is great
orks.

Seſoſtris now laid aſide all thoughts of war; and applied himſelf wholly to ſuch works as might tend to the public good, and his own future reputation. In order to prevent the incurſions of the Syrians and Arabians, he fortified the eaſt ſide of Egypt with a wall which ran from Peluſium through the deſert to Heliopolis, for 187½ miles. He raiſed alſo an incredible number of vaſt and lofty mounts of earth, to which he removed ſuch towns as had before been ſituated too low, in order to ſecure them from the inundations of the Nile. All the way from Memphis to the ſea he dug canals which branched out from the Nile, and not only made an eaſier communication between different places, but rendered the country in a great meaſure impaſſable to an enemy. He erected a temple in every city in Egypt, and dedicated it to the ſupreme deity of the place; but in the courſe of ſuch a great undertaking as this neceſſarily muſt have been, he took care not to employ any of his Egyptian ſubjects. Thus he ſecured their affection, and employed the vaſt multitude of captives he had brought along with him; and to perpetuate the memory of a tranſaction ſo remarkable, he cauſed to be inſcribed on all theſe temples, “No one native laboured hereon.” In the city of Memphis, before the temple of Vulcan, he raiſed ſix gigantic ſtatues, each of one ſtone. Two of them were 30 cubits high, repreſenting himſelf and his wife. The other four were 20 cubits each, and repreſented his four ſons. Theſe he dedicated to Vulcan in memory of his abovementioned deliverance. He raiſed alſo two obeliſks of marble 120 cubits high, and charged them with inſcriptions, denoting the greatneſs of his power, his revenues, &c.

The captives taken by Seſoſtris are ſaid to have been treated with the greateſt barbarity, ſo that at laſt they reſolved at all events to deliver themſelves from a ſervitude ſo intolerable. The Babylonians particularly were concerned in this revolt, and laid waſte the country to ſome extent; but being offered a pardon, and a place to dwell in, they were pacified, and built for themſelves a city which they called *Babylon*. Towards the conquered princes who waited on him with their tribute, the Egyptian monarch behaved with unparallelled inſolence. On certain occaſions he is ſaid to have unharneſſed his horſes, and, yoking kings together, made them draw his chariot. One day, however, obſerving one of the kings who drew his chariot to look back upon the wheels with great earneſtneſs, he aſked what made him look ſo attentively at them. The unhappy prince replied, “O king, the going round of the wheel puts me in mind of the viciſſitudes of fortune: for as every part of the wheel is uppermoſt and lowermoſt by turns, ſo it is with men; who one day ſit on a throne, and on the next are reduced to the vileſt degree of ſlavery.” This anſwer brought the inſulting conqueror to his ſenſes; ſo that he gave over the practice, and thenceforth treated his captives with great humanity. At length this mighty monarch loſt his ſight, and laid violent hands on himſelf. 5 His death.

After the death of Seſoſtris, we meet with another chaſm of an indeterminate length in the Egyptian hiſtory. It concludes with the reign of Amaſis or Ammoſis; who being a tyrant, his ſubjects joined Actiſanes the king of Ethiopia, to drive him out.---Thus Actiſanes became maſter of the kingdom; and after his death follows another chaſm in the hiſtory, during which the empire is ſaid to have been in a ſtate of anarchy for five generations.---This period brings us down to the times of the Trojan war. The reigning prince in Egypt was at that time called *Cetes;* by the Greeks, *Proteus*. The prieſts reported that he was a magician; and that he could aſſume any ſhape he pleaſed, even that of fire. 6 Origin of the fable of Proteus. This fable, as told by the Greeks, drew its origin from a cuſtom among the Egyptians, perhaps introduced by Proteus. They were uſed to adorn and diſtinguiſh the heads of their kings with the repreſentations of animals or vegetables, or even with burning incenſe, in order to ſtrike the beholders with the greater awe.

7 Arrival of Paris and Helen in Egypt.

Whilſt Proteus reigned, Paris or Alexander, the ſon of Priam king of Troy, was driven by a ſtorm on the coaſts of Egypt, with Helen, whom he was carrying off from her huſband. But when the Egyptian monarch heard of the breach of hoſpitality committed by Paris, he ſeized him, his miſtreſs, and companions, with all the riches he had brought away with him from Greece. He detained Helen, with all the effects belonging to Menelaus her huſband, promiſing to reſtore them to the injured party whenever they were demanded; but commanded Paris and his companions to depart out of his dominions in three days, on pain of being treated as enemies. In what manner Paris afterwards prevailed upon Proteus to reſtore his miſtreſs, we are not told; neither do we know any thing further of the tranſactions of this prince's reign nor of his ſucceſſors, except what has entirely the air of fable, till the days of *Sabbaco* the Ethiopian, who again conquered this kingdom.

8 Egypt conquered by Sabbaco.

He began his reign with an act of great cruelty, cauſing the conquered prince to be burnt alive: nevertheleſs, he no ſooner ſaw himſelf firmly eſtabliſhed on the throne of Egypt, than he became a new man; ſo that he is highly extolled for his mercy, clemency, and wiſdom. He is thought to have been the *So* mentioned in ſcripture, and who entered into a league with Hoſhea king of Iſrael againſt *Shalmaneſer* king of Aſſyria. He is ſaid to have been excited to the invaſion of Egypt by a dream or viſion, in which he was aſſured, that he ſhould hold that kingdom for 50 years. Accordingly, he conquered Egypt, as had been foretold; and at the expiration of the time above-mentioned, he had another dream, in which the tutelar god of Thebes acquainted him, that he could no longer hold the kingdom of Egypt with ſafety and happineſs, unleſs he maſſacred the prieſts as he paſſed through them with his guards. Being haunted with this viſion, and at the ſame time abhorring to hold the kingdom on ſuch terms, he ſent for the prieſts, and acquainted them with what ſeemed to be the will of the gods. Upon this it was concluded, that it was the pleaſure of the Deity that Sabbaco ſhould remain no longer in Egypt; and therefore he immediately quitted that kingdom, and returned to Ethiopia.

9 Remarkable ſtory of Sethon.

Of *Anyſias*, who was Sabbaco's immediate ſucceſſor, we have no particulars worth notice. After him reigned one Sethon, who was both king and prieſt of Vulcan. He gave himſelf up to religious contemplation; and not only neglected the military claſs, but deprived them of their lands. At this they were ſo much incenſed, that they entered into an agreement not to bear arms under him; and, in this ſtate of affairs, Sennacherib king of Aſſyria arrived before Peluſium with a mighty army. Sethon now applied to his ſoldiers, but in vain: they unanimouſly perſiſted in refuſing to march under his banner. Being therefore deſtitute of all human aid, he applied to the god Vulcan, and requeſted him to deliver him from his enemies. Whilſt he was yet in the temple of that god, it is ſaid, he fell into a deep ſleep; during which, he ſaw Vulcan ſtanding at his ſide, and exhorting him to take courage. He promiſed, that if Sethon would but go out againſt the Aſſyrians, he ſhould obtain a complete victory over them. Encouraged by this aſſurance, the king aſſembled a body of artificers, ſhop-keepers, and labourers; and, with this undiſciplined rabble, marched towards Peluſium. He had no occaſion, however, to fight; for the very night after his arrival at Peluſium, an innumerable multitude of field-rats entering the enemies camp, gnawed to pieces their quivers, bowſtrings, and ſhield-ſtraps. Next morning, when Sethon found the enemy diſarmed, and on that account beginning to fly, he purſued them to a great diſtance, making a terrible ſlaughter. In memory of this extraordinary event, a ſtatue of Sethon was erected in the temple of Vulcan, holding in one hand a rat, and delivering theſe words: "Whoſoever beholdeth me, let him be pious."

Soon after the death of Sethon, the form of government in Egypt was totally changed. The kingdom was divided into twelve parts, over which as many of the chief nobility preſided. This diviſion, however, ſubſiſted but for a ſhort time.

10 Reign of Pſammitichus.

Pſammitichus, one of the twelve, dethroned all the reſt, 15 years after the diviſion had been made. The hiſtory now begins to be diveſted of fable, and from this time may be accounted equally certain with that of any other nation. The vaſt conqueſts of Seſoſtris were now no longer known; for Pſammitichus poſſeſſed no more than the country of Egypt itſelf. It appears, indeed, that none of the ſucceſſors of Seſoſtris, or even that monarch himſelf, had made uſe of any means to keep in ſubjection the countries he had once conquered. Perhaps, indeed, his deſign originally was rather to *pillage* than to conquer; and therefore, on his return, his vaſt empire vaniſhed at once. Pſammitichus, however, endeavoured to extend his dominions by making war on his neighbours; but by putting more confidence in foreign auxiliaries than in his own ſubjects, the latter were ſo much offended, that upwards of 200,000 fighting men emigrated in a body, and took up their reſidence in Ethiopia.—To repair this loſs, Pſammitichus earneſtly applied himſelf to the advancement of commerce; and opened his ports to all ſtrangers, whom he greatly careſſed, contrary to the cruel maxims of his predeceſſors, who refuſed to admit them into the country. He alſo laid ſiege to the city of Azotus in Syria, which held out for 29 years againſt the whole ſtrength of the kingdom; from which we may gather, that, as a warriour, Pſammitichus was by no means remarkable. He is reported to have been the firſt king of Egypt that drank wine. He alſo ſent to diſcover the ſprings of the Nile; and is ſaid to have attempted to diſcover the moſt ancient nation in the world by the following method. Having procured two newly born children, he cauſed them to be brought up in ſuch a manner, that they never heard a human voice. He imagined that theſe children would naturally ſpeak the original language of mankind: therefore, when, at two years of age, they pronounced the Phrygian word *beccos*, (or ſome ſound reſembling it), which ſignifies bread, he concluded that the Phrygians were the moſt ancient people in the world.

11 Succeeded by Nechus.

Nechus, the ſon and ſucceſſor of Pſammitichus, is the *Pharaoh-Necho* of ſcripture, and was a prince of an enterpriſing and warlike genius. In the beginning of his reign, he attempted to cut through the iſthmus of Suez, between the Red Sea and the Mediterranean; but, through the invincible obſtacles which nature has thrown in the way of ſuch undertakings, he was obliged to abandon the enterpriſe, after having loſt 120,000 men in the attempt. After this, he ſent a ſhip, manned with ſome expert Phœnician mariners, on a voyage to explore the coaſts of Africa. Accordingly, they performed the voyage; ſailed round the continent of Africa; and after three years returned to Egypt, where their relation was deemed incredible. See AFRICA.

12
His wars with Joſiah and Nebuchadnezzar.

The moſt remarkable wars in which this king was engaged, are recorded in the ſacred writings. He went out againſt the king of Aſſyria, by the divine command, as he himſelf told Joſiah; but being oppoſed by this king of Judæa, he defeated and killed him at Megiddo; after which he ſet up, in that country, king Jehoiakim, and impoſed on him an annual tribute of 100 talents of ſilver and one talent of gold. He then proceeded againſt the king of Aſſyria; and weakened him ſo much, that the empire was ſoon after diſſolved. Thus he became maſter of Syria and Phœnicia; but, in a ſhort time, Nebuchadnezzar king of Babylon came againſt him with a mighty army. The Egyptian monarch, not daunted by the formidable appearance of his antagoniſt, boldly ventured a battle; but was overthrown with prodigious ſlaughter, and Nebuchadnezzar became maſter of all the country to the very gates of Peluſium.

13
Apries a martial and ſucceſsful prince.

The reign of Apries, the *Pharaoh-Hophra* of ſcripture, preſents us with a new revolution in the Egyptian affairs. He is repreſented as a martial prince, and in the beginning of his reign very ſucceſsful. He took by ſtorm the rich city of Sidon; and having overcome the Cypriots and Phœnicians in a ſea-fight, returned to Egypt laden with ſpoil. This ſucceſs probably incited Zedekiah king of Judæa to enter into an alliance with him againſt Nebuchadnezzar king of Babylon. The bad ſucceſs of this alliance was foretold by the prophet Jeremiah; and accordingly it happened. For Nebuchadnezzar having ſat down with his army before Jeruſalem, Apries marched from Egypt with a deſign to relieve the city; but no ſooner did he perceive the Babylonians approaching him, than he retreated as faſt as he could, leaving the Jews expoſed to the rage of their mercileſs enemies; who were thereupon treated as Jeremiah had foretold; and by this ſtep Apries brought upon himſelf the vengeance denounced by the ſame prophet.—The manner in which theſe predictions were fulfilled, is as follows. The Cyreneans, a colony of the Greeks, being greatly ſtrengthened by a numerous ſupply of their countrymen under their third king *Battus* ſtyled *the happy*, and encouraged by the Pythian oracle, began to drive out their Libyan neighbours, and ſhare their poſſeſſions among themſelves. Hereupon Andican king of Libya ſent a ſubmiſſive embaſſy to Apries, and implored his protection againſt the Cyreneans. Apries complied with his requeſt, and ſent a powerful army to his relief. The Egyptians were defeated with great ſlaughter; and thoſe who returned complained that the army had been ſent off by Apries in order to be deſtroyed, and that he might tyrannize without controul over the remainder of his ſubjects. This thought catching the attention of the giddy multitude, an almoſt univerſal defection enſued. Apries ſent one Amaſis, a particular friend, in whom he thought he could confide, to bring back his people to a ſenſe of their duty. But by this friend he was betrayed; for Amaſis, taking the opportunity of the preſent ferment, cauſed himſelf to be proclaimed king. Apries then diſpatched one Patarbemis, with orders to take Amaſis, and bring him alive before him. This he found impoſſible, and therefore returned without his priſoner; at which the king was ſo enraged, that he commanded Patarbemis's noſe and ears to be cut off. This piece of cruelty completed his ruin; for when the reſt of the Egyptians who continued faithful to Apries beheld the inhuman mutilation of ſo worthy and noble a perſon as Patarbemis was, they to a man deſerted Apries, and went over to Amaſis.

14
Bad conſequences of his alliance with Zedekiah.

15
His ſubjects revolt.

Both parties now prepared for war; the uſurper having under his command the whole body of native Egyptians; and Apries only thoſe Ionians, Carians, and other mercenaries whom he could engage in his ſervice. The army of Apries amounted only to 30,000; but, though greatly inferior in number to the troops of his rival, as he well knew that the Greeks were much ſuperior in valour, he did not doubt of victory. Nay, ſo far was Apries puffed up with this notion, that he did not believe it was in the power, even of any *God*, to deprive him of his kingdom. The two armies ſoon met, and drew up in order of battle near Memphis. A bloody engagement enſued; in which, tho' the army of Apries behaved with the greateſt reſolution, they were at laſt overpowered with numbers, and utterly defeated, the king himſelf being taken priſoner. Amaſis now took poſſeſſion of the throne without oppoſition. He confined Apries in one of his palaces, but treated him with great care and reſpect. The people, however, were implacable, and could not be ſatisfied while he enjoyed his life. Amaſis, therefore, at laſt found himſelf obliged to deliver him into their hands. Thus the prediction received its final completion: Apries was delivered up to thoſe *who ſought his life*; and who no ſooner had him in their power, than they ſtrangled him, and laid his body in the ſepulchre of his anceſtors.

16
Apries defeated and taken priſoner by Amaſis.

17
Egypt invaded by Nebuchadnezzar.

During theſe inteſtine broils, which muſt have greatly weakened the kingdom, it is probable that Nebuchadnezzar invaded Egypt. He had been for 13 years before this employed in beſieging Tyre, and at laſt had nothing but an empty city for his pains. To make himſelf ſome amends, therefore, he entered Egypt, miſerably harraſſed the country, killed and carried away great numbers of the inhabitants, ſo that the country did not recover from the effects of this incurſion for a long time after. In this expedition, however, he ſeems not to have aimed at any permanent conqueſt, but to have been induced to it merely by the love of plunder, and of this he carried with him an immenſe quantity to Babylon.

18
Happy adminiſtration of Amaſis.

During the reign of Amaſis, Egypt is ſaid to have been perfectly happy, and to have contained 20,000 populous cities. That good order might be kept among ſuch vaſt numbers of people, Amaſis enacted a law, by which every Egyptian was bound once a-year to inform the governor of his province by what means he gained his livelihood; and if he failed of this, to put him to death. The ſame puniſhment he decreed to thoſe who could not give a ſatisfactory account of themſelves.

This monarch was a great favourer of the Greeks, and married a woman of Grecian extract. To many Greek cities, as well as particular perſons, he made conſiderable preſents. Beſide theſe, he gave leave to the Greeks in general to come into Egypt, and ſettle either in the city of Naucratis, or carry on their trade upon the ſea-coaſts; granting them alſo temples, and places where they might erect temples to their own deities. He received alſo a viſit from Solon the celebrated Athenian lawgiver, and reduced the iſland of Cyprus under his ſubjection.

19 Offends Cambyſes king of Perſia.

This great proſperity, however, ended with the death of Amaſis, or indeed before it. The Egyptian monarch had ſome how or other incenſed Cambyſes king of Perſia. The cauſe of the quarrel is uncertain; but whatever it was, the Perſian monarch vowed the deſtruction of Amaſis. In the mean time *Phanes* of Halicarnaſſus, commander of the Grecian auxiliaries in the pay of Amaſis, took ſome private diſguſt; and leaving Egypt, embarked for Perſia. He was a wiſe and able general, perfectly well acquainted with every thing that related to Egypt; and had great credit with the Greeks in that country. Amaſis was immediately ſenſible how great the loſs of this man would be to him, and therefore ſent after him a truſty eunuch with a ſwift galley. Phanes was accordingly overtaken in Lycia, but not brought back; for, making his guard drunk, he continued his journey to Perſia, and preſented himſelf before Cambyſes, as he was meditating the deſtruction of the Egyptian monarchy.

20 And Polycrates tyrant of Samos.

At this dangerous criſis, alſo, the Egyptian monarch imprudently made Polycrates the tyrant of Samos his enemy. This man had been the moſt remarkable, perhaps, of any recorded in hiſtory, for an uninterrupted courſe of ſucceſs, without the intervention of one ſingle unfortunate event. Amaſis, who was at this time in ſtrict alliance with Polycrates, wrote him a letter, in which, after congratulating him on his proſperity, he told him that he was afraid leſt his ſucceſſes were too many, and he might be ſuddenly thrown down into the greateſt miſery. For this reaſon he adviſed him voluntarily to take away ſomething from his own happineſs; and to caſt away that which would grieve him moſt if he was accidentally to loſe it. Polycrates followed his advice, and threw into the ſea a ſignet of ineſtimable value. This, however, did not anſwer the intended purpoſe. The ſignet happened to be ſwallowed by a fiſh, which was taken a few days afterwards, and thus was reſtored to Polycrates. Of this Amaſis was no ſooner informed, than, conſidering Polycrates as really *unhappy*, and already on the brink of deſtruction, he reſolved to put an end to the friendſhip which ſubſiſted between them. For this purpoſe he diſpatched an herald to Samos, commanding him to acquaint Polycrates, that he renounced his alliance, and all the obligations between them; that he might not mourn his misfortunes with the ſorrow of a friend. Thus Amaſis left Polycrates at liberty to act againſt him, if he choſe to do ſo; and accordingly he offered to aſſiſt Cambyſes with a fleet of ſhips in his Egyptian expedition.

21 Egypt invaded by Cambyſes.

Amaſis had not, however, the misfortune to ſee the calamities of his country. He died about 525 years before Chriſt, after a reign of 44 years; and left the kingdom to his ſon Pſammenitus, juſt as Cambyſes was approaching the frontiers of the kingdom. The new prince was ſcarce ſeated on the throne, when the Perſians appeared. Pſammenitus drew together what forces he could, in order to prevent them from entering the kingdom. Cambyſes, however, immediately laid ſiege to Peluſium, and made himſelf maſter of it by the following ſtratagem: he placed in the front of his army a great number of cats, dogs, and other animals that were deemed ſacred by the Egyptians. He then attacked the city, and took it without oppoſition; the garriſon, which conſiſted entirely of Egyptians, not daring to throw a dart or ſhoot an arrow againſt their enemies, leſt they ſhould kill ſome of the holy animals.

22 Cruelty and defeat of the Egyptians.

Cambyſes had ſcarce taken poſſeſſion of the city, when Pſammenitus advanced againſt him with a numerous army. But, before the engagement, the Greeks who ſerved under Pſammenitus, to ſhow their indignation againſt their treacherous countryman Phanes, brought his children into the camp, killed them in the preſence of their father and of the two armies, and then drank their blood. The Perſians, enraged at ſo cruel a ſight, fell upon the Egyptians with the utmoſt fury, put them to flight, and cut the greateſt part of them in pieces. Thoſe who eſcaped, fled to Memphis, where they were ſoon after guilty of a horrid outrage. Cambyſes ſent a herald to them in a ſhip from Mitylene: but no ſooner did they ſee her come into the port, than they flocked down to the ſhore, deſtroyed the ſhip, and tore to pieces the herald and all the crew; afterwards carrying their mangled limbs into the city, in a kind of barbarous triumph. Not long after, they were obliged to ſurrender; and thus Pſammenitus fell into the hands of his inveterate enemy, who was now enraged beyond meaſure at the cruelties exerciſed upon the children of Phanes, the herald, and the Mitylenean ſailors.

23 Their dreadful puniſhment by Cambyſes.

The rapid ſucceſs of the Perſians ſtruck with ſuch terror the Libyans, Cyreneans, Barcæans, and other dependents or allies of the Egyptian monarch, that they immediately ſubmitted. Nothing now remained but to diſpoſe of the captive king, and revenge on him and his ſubjects the cruelties which they had committed. This the mercileſs victor executed in the ſevereſt manner. On the 10th day after Memphis had been taken, Pſammenitus and the chief of the Egyptian nobility were ignominiouſly ſent into one of the ſuburbs of that city. The king being there ſeated in a proper place, ſaw his daughter coming along in the habit of a poor ſlave with a pitcher to fetch water from the river, and followed by the daughters of the greateſt families in Egypt, all in the ſame miſerable garb, with pitchers in their hands, drowned in tears, and loudly bemoaning their miſerable ſituation. When the fathers ſaw their daughters in this diſtreſs, they burſt into tears, all but Pſammenitus, who only caſt his eyes on the ground and kept them fixed there. After the young women, came the ſon of Pſammenitus, with 2000 of the young nobility, all of them with bits in their mouths, and halters round their necks, led to execution. This was done to expiate the murder of the Perſian herald and the Mitylenean ſailors; for Cambyſes cauſed ten Egyptians of the firſt rank to be publicly executed for every one of thoſe that had been ſlain. Pſammenitus, however, obſerved the ſame conduct as before, keeping his eyes ſtedfaſtly fixed on the ground, though all the Egyptians around him made the loudeſt lamentations. A little after this he ſaw an intimate friend and companion, now advanced in years, who, having been plundered of all he had, was begging his bread from door to door in the ſuburbs. As ſoon as he ſaw this man, Pſammenitus wept bitterly; and calling out to him by his name, ſtruck himſelf on the head as if he had been frantic. Of this the ſpies who had been ſet over him to obſerve his behaviour, gave immediate notice to Cambyſes, who thereupon ſent a meſſenger to inquire the cauſe of ſuch immoderate grief. Pſammenitus anſwered, That the calamities of his own family confounded him, and were too great to be lamented by any outward ſigns of grief; but the extreme diſtreſs of a boſom friend gave more room for reflection, and therefore extorted tears from him. With this anſwer Cambyſes was ſo affected, that he ſent orders to prevent the execution of the king's ſon; but theſe came too late, for the young prince had been put to death before any of the reſt. Pſammenitus himſelf was then ſent for into the city, and reſtored to his liberty: and, had he not ſhewed a deſire of revenge, might perhaps have been truſted with the goverment of Egypt; but being diſcovered hatching ſchemes of that kind, he was ſeized, and condemned to drink bull's blood.

24 Egypt becomes a province of the Perſian and afterwards of the Grecian empire.

The Egyptians were now reduced to the loweſt degree of ſlavery. Their country became a province of the Perſian empire: the body of Amaſis their late king, was taken out of his grave; and after being mangled in a ſhocking manner, was finally burnt. But what ſeemed more grievous than all the reſt, their god Apis was ſlain, and his prieſts ignominiouſly ſcourged; and this inſpired the whole nation with ſuch an hatred to the Perſians, that they could never afterwards be reconciled to them. As long as the Perſian empire ſubſiſted, the Egyptians could never ſhake off their yoke. They frequently revolted indeed, but were always overthrown with prodigious loſs. At laſt they ſubmitted, without oppoſition, to Alexander the Great: after his death, Egypt again became a powerful kingdom; though ſince the conqueſt of it by Cambyſes to the preſent time, it hath never been governed but by foreign princes, agreeable to the prophecy of Ezekiel, "There ſhall be no more a prince of the land of Egypt."

25 Aſſigned to Ptolemy Lagus, who aſſumes the title of king.

On the death of Alexander the Great, Egypt, together with Libya, and that part of Arabia which borders on Egypt, were aſſigned to Ptolemy Lagus as governor under Alexander's ſon by Roxana, who was but newly born. Nothing was farther from the intention of this governor, than to keep the provinces in truſt for another. He did not, however, aſſume the title of *king*, till he perceived his authority ſo firmly eſtabliſhed that it could not be ſhaken; and this did not happen till 19 years after the death of Alexander, when Antigonus and Demetrius had unſucceſsfully attempted the conqueſt of Egypt.

From the time of his firſt eſtabliſhment on the throne, Ptolemy, who had aſſumed the title of *Soter*, reigned 20 years; which added to the former 19, make up the 39 years which hiſtorians commonly allow him to have reigned alone.—In the 39th year of his reign, he made one of his ſons, named *Philadelphus*, partner in the empire; declaring him his ſucceſſor, to the prejudice of his eldeſt ſon named *Ceraunus*; being excited thereto by his violent love for *Berenice* Philadelphus's mother. When the ſucceſſion was thus ſettled, Ceraunus immediately quitted the court; and fled at laſt into Syria, where he was received with open arms by Seleucus Nicator, whom he afterwards murdered.

26 Succeeded by Philadelphus.

The moſt remarkable tranſaction of this reign was the embelliſhing of the city of Alexandria, which Ptolemy made the capital of his new kingdom, and of which an account is given under the article ALEXANDRIA. About 284 years before Chriſt, died Ptolemy Soter, in the 41ſt year of his reign, and 84th of his age. He was the beſt prince of his race; and left behind him an example of prudence, juſtice, and clemency, which few of his ſucceſſors choſe to follow. Beſides the provinces originally aſſigned to him, he had added to his empire thoſe of Cælo-Syria, Ethiopia, Pamphylia, Lycia, Caria, and ſome of the Cyclades. His ſucceſſor, Ptolemy Philadelphus, added nothing to the extent of the empire; nor did he perform any thing worthy of notice except embelliſhing further the city of Alexandria, and entering into an alliance with the Romans. In his time, one Magas, the governor of Libya and Cyrene, revolted; and held theſe provinces as an independent prince, notwithſtanding the utmoſt efforts of Ptolemy to reduce him. At laſt an accommodation took place; and a marriage was propoſed between Berenice, the only daughter of Magas, and Ptolemy's eldeſt ſon. The young princeſs was to receive all her father's dominions by way of dowry, and thus they would again be brought under the dominion of Ptolemy's family. But before this treaty could be put in execution, Magas died; and then Apamea, the princeſs's mother, did all ſhe could to prevent the match. This, however, ſhe was not able to do; though her efforts for that purpoſe produced a deſtructive war of four years continuance with Antiochus Theus king of Syria, and the acting of a cruel tragedy in the family of the latter. See SYRIA.

27 Ptolemy Euergetes a great conqueror.

About 246 years before Chriſt, Ptolemy Philadelphus died; and was ſucceeded by his eldeſt ſon Ptolemy, who had been married to Berenice the daughter of Magas, as above related. In the beginning of his reign, he found himſelf engaged in a war with Antiochus Theus king of Syria. From this he returned victorious, and brought with him 2500 ſtatues and pictures, among which were many of the ancient Egyptian idols, which had been carried away by Cambyſes into Perſia. Theſe were reſtored by Ptolemy to their ancient temples; in memory of which favour, the Egyptians gave him the ſurname of *Euergetes*, or the Beneficent. In this expedition, he greatly enlarged his dominions, making himſelf maſter of all the countries that lie between mount Taurus and the confines of India. An account of theſe conqueſts was given by himſelf, inſcribed on a monument, to the following effect. "Ptolemy Euergetes, having received from his father the ſovereignty of Egypt, Libya, Syria, Phænice, Cyprus, Lycia, Caria, and the other Cyclades, aſſembled a mighty army of horſe and foot, with a great fleet, and elephants, out of Trogloditia and Ethiopia; ſome of which had been taken by his father, and the reſt by himſelf, and brought from thence, and trained up for war: with this great force he ſailed into Aſia; and having conquered all the provinces which lie on this ſide the Euphrates, Cilicia, Pamphylia, Ionia, the Helleſpont, and Thrace, he croſſed that river with all the forces of the conquered countries, and the kings of thoſe nations, and reduced Meſopotamia, Babylonia, Suſia, Perſia, Media, and all the country as far as Bactria."

On the king's return from this expedition, he paſſed through Jeruſalem, where he offered many ſacrifices to the God of Iſrael, and ever afterwards expreſſed a great favour for the Jewiſh nation. At this time, the Jews were tributaries to the Egyptian monarchs, and paid them annually 20 talents of ſilver. This tribute, however, Onias, who was then high prieſt, being of a very covetous diſpoſition, had for a long time neglected to pay, ſo that the arrears amounted to a very large ſum. Soon after his return, therefore, Ptolemy ſent one of his courtiers named *Athenion* to demand the money, and deſired him to acquaint the Jews that he would make war upon them in caſe of a refuſal. A young man, however, named *Joſeph*, nephew to Onias, not only found means to avert the king's anger, but even got himſelf choſen his receiver-general, and by his faithful diſcharge of that important truſt, continued in high favour with Ptolemy as long as he lived.

Ptolemy Euergetes, having at laſt concluded a peace with Seleucus the ſucceſſor of Antiochus Theus king of Syria, attempted the enlargement of his dominions on the ſouth ſide. In this he was attended with ſuch ſucceſs, that he made himſelf maſter of all the coaſts of the Red Sea, both on the Arabian and Ethiopian ſides, quite down to the ſtraits of Babel-mandel. On his return he was met by ambaſſadors from the Achæans, imploring his aſſiſtance againſt the Etolians and Lacedemonians. This the king readily promiſed them: but they having in the mean time engaged Antigonus king of Macedon to ſupport them, Ptolemy was ſo much offended, that he ſent powerful ſuccours to Cleomenes king of Sparta; hoping, by that means, to humble both the Achæans and their new ally Antigonus. In this, however, he was diſappointed; for Cleomenes, after having gained very conſiderable advantages over the enemy, was at laſt entirely defeated in the battle of Sellaſia, and obliged to take refuge in Ptolemy's dominions. He was received by the Egyptian monarch with the greateſt demonſtrations of kindneſs; a yearly penſion of 24 talents was aſſigned him, with a promiſe of reſtoring him to the Spartan throne; but before this could be accompliſhed, the king of Egypt died, in the 27th year of his reign, and was ſucceeded by his ſon Ptolemy Philopator.

28
Cleomenes king of Sparta takes refuge in Egypt.

Thus we have ſeen the Egyptian empire brought to a very great height of power; and had the ſucceeding monarchs been careful to preſerve that ſtrength of empire tranſmitted to them by Euergetes, it is very probable that Egypt might have been capable of holding the balance againſt Rome, and, after the deſtruction of Carthage, prevented that haughty city from becoming miſtreſs of the world. But after the death of Ptolemy Euergetes, the Egyptian empire, being governed only by weak or vicious monarchs, quickly declined, and from that time makes no conſpicuous figure in hiſtory. Ptolemy Philopator began his reign with the murder of his brother; after which, giving himſelf up to all manner of licentiouſneſs, the kingdom fell into a kind of anarchy. Cleomenes, the Spartan king, ſtill reſided at court; and being now unable to bear the diſſolute manners which prevailed there, he preſſed Philopator to give him the aſſiſtance he had promiſed for reſtoring him to the throne of Sparta. This he the rather inſiſted upon, becauſe he had received advice that Antigonus king of Macedon was dead, that the Achæans were engaged in a war with the Etolians, and that the Lacedemonians had joined the latter againſt the Achæans and Macedonians. Ptolemy, when afraid of his brother Magas, had indeed promiſed to aſſiſt the king of Sparta with a powerful fleet, hoping by this means to attach him to his own intereſt: but now when Magas was out of the way, it was determined by the king, or rather his miniſters, that Cleomenes ſhould not be aſſiſted, nor even allowed to leave the kingdom; and this extravagant reſolution produced the deſperate attempt of Cleomenes, of which an account is given in the hiſtory of SPARTA.

29
Ptolemy Philopator a cruel tyrant.

Of the diſorders which now enſued in the government, Antiochus, king of Syria, ſurnamed *the Great*, took the advantage, and attempted to wreſt from Ptolemy the provinces of Cælo-Syria and Paleſtine: but in this he was finally diſappointed; and might eaſily have been totally driven out of Syria, had not Ptolemy been too much taken up with his debaucheries to think of carrying on the war. The diſcontent occaſioned by this piece of negligence ſoon produced a civil war in his dominions, and the whole kingdom continued in the utmoſt confuſion till his death, which happened in the 17th year of his reign, and 37th of his age.

30
Extraordinary ſtory concerning the Jews.

During the reign of Philopator happened a very extraordinary event with regard to the Jews, which is mentioned in the Maccabees *. The king of Egypt, while on his Syrian expedition, had attempted to enter the temple of Jeruſalem; but being hindered by the Jews, he was filled with the utmoſt rage againſt the whole nation. On his return to Alexandria, he reſolved to make thoſe who dwelt in that city feel the firſt effects of his vengeance. He began with publiſhing a decree, which he cauſed to be engraved on a pillar erected for that purpoſe at the gate of his palace, excluding all thoſe who did not ſacrifice to the gods worſhipped by the king. By this means the Jews were debarred from ſuing to him for juſtice, or obtaining his protection when they happened to ſtand in need of it. By the favour of Alexander the Great, Ptolemy Soter, and Euergetes, the Jews enjoyed, at Alexandria, the ſame privileges with the Macedonians. In that metropolis the inhabitants were divided into three ranks or claſſes. In the firſt were the Macedonians, or original founders of the city, and along with them were enrolled the Jews. In the ſecond were the Mercenaries who had ſerved under Alexander; and in the third, the native Egyptians. Ptolemy now, to be revenged of the Jews, ordered, by another decree, that they ſhould be degraded from the firſt rank, and enrolled among the native Egyptians. By the ſame decree it was enacted, that all of that nation ſhould appear at an appointed time before the proper officers, in order to be enrolled among the common people; that at the time of their enrollment they ſhould have the mark of an ivy leaf, the badge of Bacchus, impreſſed with a hot iron on their faces; that all who were thus marked, ſhould be made ſlaves; and laſtly, that if any one ſhould ſtand out againſt this decree, he ſhould be immediately put to death. That he might not, however, ſeem an enemy to the whole nation, he declared, that thoſe who ſacrificed to his gods ſhould enjoy their former

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* L. iii. 2, 3, 4, 5.

mer privileges, and remain in the ſame claſs. Yet, notwithſtanding this tempting offer, 300 only, out of many thouſand Jews who lived in Alexandria, could be prevailed upon to abandon their religion in order to ſave themſelves from ſlavery.

The apoſtates were immediately excommunicated by their brethren: and this their enemies conſtrued as done in oppoſition to the king's order; which threw the tyrant into ſuch a rage, that he reſolved to extirpate the whole nation, beginning with the Jews who lived in Alexandria and other cities of Egypt, and proceeding from thence to Judæa and Jeruſalem itſelf. In conſequence of this cruel reſolution, he commanded all the Jews that lived in any part of Egypt to be brought in chains to Alexandria, and there to be ſhut up in the Hippodrome, which was a very ſpacious place without the city, where the people uſed to aſſemble to ſee horſe-races and other public diverſions. He then ſent for Hermon, maſter of the elephants; and commanded him to have 500 of theſe animals ready againſt the next day, to let looſe upon the Jews in the Hippodrome. But when the elephants were prepared for the execution, and the people were aſſembled in great crowds to ſee it, they were, for that day, diſappointed by the king's abſence. For, having been late up the night before with ſome of his debauched companions, he did not awake till the time for the ſhew was over, and the ſpectators returned home. He therefore ordered one of his ſervants to call him early on the following day, that the people might not meet with a ſecond diſappointment. But when the perſon awaked him according to his order, the king was not yet returned to his ſenſes; having withdrawn, exceedingly drunk, only a ſhort time before. As he did not remember the order, he therefore fell into a violent paſſion, and threatened with death the ſervant who had awaked him; and this cauſed the ſhew to be put off till the third day. At laſt the king came to the Hippodrome, attended with a vaſt multitude of ſpectators; but when the elephants were let looſe, inſtead of falling upon the Jews, they turned their rage againſt the ſpectators and ſoldiers, and deſtroyed great numbers of them. At the ſame time, ſome frightful appearances which were ſeen in the air, ſo terrified the king that he commanded the Jews to be immediately ſet at liberty, and reſtored them to their former privileges. No ſooner were they delivered from this danger, than they demanded leave to put to death ſuch of their nation as had abandoned their religion; and this being granted, they diſpatched the apoſtates without excepting a ſingle man.

31
tolemy
hilometor
ken priner by
ntiochus,
d Phyſn raiſed
the
rone.

Philopator was ſucceeded by Ptolemy Epiphanes; and he, after a reign of 24 years, by Ptolemy Philometor. In the beginning of his reign, a war commenced with the king of Syria, who had ſeized on the provinces of Cœle-Syria and Paleſtine in the preceding reign. In the courſe of this war, Philometor was either voluntarily delivered up to Antiochus, or taken priſoner. But, however this was, the Alexandrians deſpairing of his ever being able to recover his liberty, raiſed to the throne his brother Ptolemy, who took the name of Euergetes II. but was afterwards called *Phyſcon*, or the *great-bellied*, on account of the prominent belly which by his gluttony and luxury he had acquired. He was ſcarce ſeated on the throne, however, when Antiochus Epiphanes, returning into Egypt, drove out Phyſcon, and reſtored the whole kingdom, except Peluſium, to Philometor. His deſign was to kindle a war betwixt the two brothers, ſo that he might have an opportunity of ſeizing the kingdom for himſelf. For this reaſon he kept to himſelf the city of Peluſium; which being the key of Egypt, he might at his pleaſure re-enter the country. But Philometor, appriſed of his deſign, invited his brother Phyſcon to an accomodation; which was happily effected by their ſiſter *Cleopatra*. In virtue of this agreement, the brothers were to reign jointly, and to oppoſe to the utmoſt of their power Antiochus, whom they conſidered as a common enemy. On this the king of Syria invaded Egypt with a mighty army, but was prevented by the Romans from conquering it.

32
Philometor reſtored, and reigns jointly with his brother.

33
Difference between the two brothers decided by the Roman ſenate.

The two brothers were no ſooner freed from the apprehenſions of a foreign enemy, than they began to quarrel with each other. Their differences ſoon came to ſuch a height, that the Roman ſenate interpoſed. But before the ambaſſadors employed to inquire into the merits of the cauſe could arrive in Egypt, Phyſcon had driven Philometor from the throne, and obliged him to quit the kingdom. On this the dethroned prince fled to Rome, where he appeared meanly dreſſed, and without attendants. He was very kindly received by the ſenate; who were ſo well ſatisfied of the injuſtice done him, that they immediately decreed his reſtoration. He was reconducted accordingly; and, on the arrival of the ambaſſadors in Egypt, an accommodation between the two brothers was negociated. By this agreement, Phyſcon was put in poſſeſſion of Libya and Cyrene, and Philometor of all Egypt and the iſland of Cyprus; each of them being declared independent of the other in the dominion allotted to them. The treaty, as uſual, was confirmed with oaths and ſacrifices, and was broken almoſt as ſoon as made. Phyſcon was diſſatisfied with his ſhare of the dominions; and therefore ſent ambaſſadors to Rome, deſiring that the iſland of Cyprus might be added to his other poſſeſſions. This could not be obtained by the ambaſſadors; and therefore Phyſcon went to Rome in perſon. His demand was evidently unjuſt; but the Romans, conſidering that it was their intereſt to weaken the power of Egypt as much as poſſible, without further ceremony adjudged the iſland to him.

34
Iſland of Cyprus adjudged to Phyſcon.

Phyſcon ſet out from Rome with two ambaſſadors; and arriving in Greece on his way to Cyprus, he raiſed there a great number of mercenaries, with a deſign to ſail immediately to that iſland and conquer it. But the Roman ambaſſadors telling him, that they were commanded to put him in poſſeſſion of it by fair means, and not by force, he diſmiſſed his army, and returned to Libya, while one of the ambaſſadors proceeded to Alexandria. Their deſign was to bring the two brothers to an interview on the frontiers of their dominions, and there to ſettle matters in an amicable manner. But the ambaſſador who went to Alexandria, found Philometor very averſe from compliance with the decree of the ſenate. He put off the ambaſſador ſo long, that Phyſcon ſent the other alſo to Alexandria, hoping that the joint perſuaſions of the two would induce Philometor to comply. But the king, after entertaining them at an immenſe charge for 40 days, at laſt plainly refuſed to ſubmit, and told the ambaſſadors

35
Philometor refuſes to comply.

that he was reſolved to adhere to the firſt treaty. With this anſwer the Roman ambaſſadors departed, and were followed by others from the two brothers. The ſenate, however, not only confirmed their decree in favour of Phyſcon, but renounced their alliance with Philometor, and commanded his ambaſſador to leave the city in five days.

36 Rebellion againſt Phyſcon.

In the mean time, the inhabitants of Cyrene, having heard unfavourable accounts of Phyſcon's behaviour during the ſhort time he reigned in Alexandria, conceived ſo ſtrong an averſion againſt him, that they reſolved to keep him out of their country by force of arms. On receiving intelligence of this reſolution, Phyſcon dropped all thoughts of Cyprus for the preſent; and haſtened with all his forces to Cyrene, where he ſoon got the better of his rebellious ſubjects, and eſtabliſhed himſelf in the kingdom. His vicious and tyrannical conduct, however, ſoon eſtranged from him the minds of his ſubjects, in ſuch a manner, that ſome of them entering into a conſpiracy againſt him, fell upon him one night as he was returning to his palace, wounded him in ſeveral places, and left him for dead on the ſpot. This he laid to the charge of his brother Philometor; and as ſoon as he was recovered, took another voyage to Rome. Here he made his complaints to the ſenate, and ſhewed them the ſcars of his wounds, accuſing his brother of having employed the aſſaſſins from whom he received them. Though Philometor was known to be a man of a moſt humane and mild diſpoſition, and therefore very unlikely to have been concerned in ſo black an attempt; yet the ſenate, being offended at his refuſing to ſubmit to their decree concerning the iſland of Cyprus, hearkened to this falſe accuſation; and carried their prejudice ſo far, that they not only refuſed to hear what his ambaſſadors had to ſay, but ordered them immediately to depart from the city. At the ſame time, they appointed five commiſſioners to conduct Phyſcon into Cyprus, and put him in poſſeſſion of that iſland, enjoining all their allies in thoſe parts to ſupply him with forces for that purpoſe.

Phyſcon having by this means got together an army which ſeemed to him to be ſufficient for the accompliſhment of his deſign, landed in Cyprus; but being there encountered by Philometor in perſon, he was entirely defeated, and obliged to ſhelter himſelf in a city called *Lapitho*. Here he was cloſely beſieged, and at laſt obliged to ſurrender. Every one now expected that Phyſcon would have been treated as he deſerved; but his brother, inſtead of puniſhing, reſtored him to the government of Libya and Cyrene, adding ſome other territories inſtead of the iſland of Cyprus, and promiſing him his daughter in marriage. Thus an end was put to the war between the two brothers; for the Romans were aſhamed any longer to oppoſe a prince who had given ſuch a ſignal inſtance of his juſtice and clemency.

37 He is defeated and taken priſoner by Philometor.

On his return to Alexandria, Philometor appointed one Archias governor of Cyprus. But he, ſoon after the king's departure, agreed with Demetrius king of Syria, to betray the iſland to him for 500 talents. The treachery was diſcovered before it took effect; and the traitor, to avoid the puniſhment due to his crime, laid violent hands on himſelf. Ptolemy being offended with Demetrius for this attempt on Cyprus, joined Attalus king of Pergamus, and Ariarathes king of Cappadocia, in ſetting up a pretender to the crown of Syria. This was Alexander Balas; to whom he even gave his daughter Cleopatra in marriage, after he had placed him on the throne of Syria. But he, notwithſtanding theſe and many other favours, being ſuſpected of having entered into a plot againſt his benefactor, Ptolemy became his greateſt enemy; and marching againſt him, routed his army in the neighbourhood of Antioch. He did not, however, long enjoy his victory; for he died in a few days after the engagement, of the wounds he had received.

38 Death of Philometor.

On the death of Philometor, Cleopatra the queen deſigned to ſecure the throne for her ſon. But ſome of the principal nobility declaring for Phyſcon, a civil war was about to enſue, when matters were compromiſed on condition that Phyſcon ſhould marry Cleopatra, that he ſhould reign jointly with her during his life, and declare her ſon by Philometor heir to the crown. Theſe terms were no ſooner agreed upon than Phyſcon married Cleopatra, and, on the very day of the nuptials, murdered her ſon in her arms.—This was only a prelude to the cruelties which he afterwards practiſed on his ſubjects. He was no ſooner ſeated on the throne, than he put to death all thoſe who had ſhewn any concern for the murder of the young prince. He then wrecked his fury on the Jews, whom he treated more like ſlaves than ſubjects, on account of their having favoured the cauſe of Cleopatra. His own people were treated with little more ceremony. Numbers of them were every day put to death for the ſmalleſt faults, and often for no fault at all, but merely to gratify his inhuman temper. His cruelty towards the Alexandrians is particularly mentioned under the article ALEXANDRIA.—In a ſhort time, being wearied of his queen, who was alſo his ſiſter, he divorced her; and married her daughter, who was alſo called *Cleopatra*, and whom he had previouſly raviſhed. In ſhort, his behaviour was ſo exceedingly wicked, that it ſoon became quite intolerable to his ſubjects; and he was obliged to fly to the iſland of Cyprus with his new queen, and *Memphitis*, a ſon he had by her mother.

39 Monſtrous wickedneſs of Phyſcon.

40 He is driven out.

On the flight of the king, the divorced queen was placed on the throne by the Alexandrians; but Phyſcon, fearing leſt a ſon whom he had left behind ſhould be appointed king, ſent for him into Cyprus, and cauſed him to be aſſaſſinated as ſoon as he landed. This provoked the people againſt him to ſuch a degree, that they pulled down and daſhed to pieces all the ſtatues which had been erected to him in Alexandria. This the tyrant ſuppoſed to have been done at the inſtigation of the queen, and therefore reſolved to revenge it on her by killing his own ſon whom he had by her. He therefore, without the leaſt remorſe, cauſed the young prince's throat to be cut; and having put his mangled limbs into a box, ſent them as a preſent to his mother Cleopatra. The meſſenger with whom this box was ſent, was one of his guards. He was ordered to wait till the queen's birth-day, which approached, and was to be celebrated with extraordinary pomp; and in the midſt of the general rejoicing, he was to deliver the preſent.

41 Murders his ſon.

The horror and deteſtation occaſioned by this unexampled piece of cruelty cannot be expreſſed. An army was ſoon raiſed, and the command of it given to one *Marſyas*, whom the queen had appointed general, and enjoined to take all the neceſſary ſteps for the defence

Egypt.

fence of the country. On the other hand, Phyſcon, having hired a numerous body of mercenaries, ſent them, under the command of one *Hegelochus*, againſt the Egyptians. The two armies met on the frontiers of Egypt, on which a bloody battle enſued; but at laſt the Egyptians were entirely defeated, and Marſyas was taken priſoner. Every one expected that the captive general would have been put to death with the ſevereſt torments: but Phyſcon, perceiving that his cruelties only exaſperated the people, reſolved to try whether he could regain their affections by lenity; and therefore pardoned Marſyas, and ſet him at liberty.—Cleopatra, in the mean time, being greatly diſtreſſed by this overthrow, demanded aſſiſtance from Demetrius king of Syria, who had married her eldeſt daughter by Philometor, promiſing him the crown of Egypt for his reward. Demetrius accepted the propoſal without heſitation, marched with all his forces into Egypt, and there laid ſiege to Peluſium. But he being no leſs hated in Syria than Phyſcon was in Egypt, the people of Antioch, taking advantage of his abſence, revolted againſt him, and were joined by moſt of the other cities in Syria. Thus Demetrius was obliged to return; and Cleopatra, being now in no condition to oppoſe Phyſcon, fled to Ptolemais, where her daughter the queen of Syria at that time reſided. Phyſcon was then reſtored to the throne of Egypt, which he enjoyed without further moleſtation till his death; which happened at Alexandria, in the 29th year of his reign, and 67th of his age.

42
hyſcon re-
ored.

To Phyſcon ſucceeded Ptolemy Lathyrus, about 122 years before Chriſt; but he had not reigned long, before his mother, finding that he would not be entirely governed by her, by falſe ſurmiſes ſtirred up the Alexandrians, who drove him from the throne, and placed on it his youngeſt brother Alexander. Lathyrus after this was obliged to content himſelf with the government of Cyprus, which he was permitted to enjoy in quiet. Ptolemy Alexander, in the mean time, finding he was to have only the ſhadow of ſovereignty, and that his mother Cleopatra was to have all the power, ſtole away privately from Alexandria. The queen uſed every artifice to bring him back, as well knowing that the Alexandrians would never ſuffer her to reign alone. At laſt her ſon yielded to her intreaties; but ſoon after, underſtanding that ſhe had hired aſſaſſins to diſpatch him, he cauſed her to be murdered.

43
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44
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ored.

The death of the queen was no ſooner known to the Alexandrians, than, diſdaining to be commanded by a parricide, they drove out Alexander, and recalled Lathyrus.—The depoſed prince for ſome time led a rambling life in the iſland of Cos; but having got together ſome ſhips, he, the next year, attempted to return into Egypt. But, being met by *Tyrrhus*, Lathyrus's admiral, he was defeated, and obliged to fly to Myra in Lycia. From Myra he ſteered his courſe towards Cyprus, hoping that the inhabitants would place him on the throne, inſtead of his brother. But *Chareas*, another of Lathyrus's admirals, coming up with him while he was ready to land, an engagement enſued, in which Alexander's fleet was diſperſed, and he himſelf killed.

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During theſe diſturbances, *Apion* king of Cyrenaica, the ſon of Ptolemy Phyſcon by a concubine, having maintained peace and tranquillity in his dominions during a reign of 21 years, died, and by his will left his kingdom to the Romans; and thus the Egyptian empire was conſiderably reduced and circumſcribed.

46
City of
Thebes
ruined.

Lathyrus being now delivered from all competitors, turned his arms againſt the city of Thebes, which had revolted from him. The king marched in perſon againſt the rebels; and, having defeated them in a pitched battle, laid cloſe ſiege to their city. The inhabitants defended themſelves with great reſolution for three years. At laſt, however, they were obliged to ſubmit, and the city was given up to be plundered by the ſoldiery. They left every where the moſt melancholy monuments of their avarice and cruelty; ſo that Thebes, which till that time had been one of the moſt wealthy cities of Egypt, was now reduced ſo low that it never afterwards made any figure.

47
Alexander
II. ſucceeds
Lathyrus.

About 76 years before Chriſt, Ptolemy Lathyrus was ſucceeded by Alexander II. He was the ſon of the Ptolemy Alexander for whom Lathyrus had been driven out; and had met with many adventures. He was firſt ſent by Cleopatra into the iſland of Cos, with a great ſum of money, and all her jewels; as thinking that was the ſafeſt place where they could be kept. When Mithridates king of Pontus made himſelf maſter of that iſland, the inhabitants delivered up to him the young Egyptian prince, together with all the treaſures. Mithridates gave him an education ſuitable to his birth; but he, not thinking himſelf ſafe with a prince who had ſhed the blood of his own children, fled to the camp of Sylla the Roman dictator, who was then making war in Aſia. From that time he lived in the family of the Roman general, till news was brought to Rome of the death of Lathyrus. Sylla then ſent him to Egypt to take poſſeſſion of the throne. But, before his arrival, the Alexandrians had choſen Cleopatra for their ſovereign. To compromiſe matters, however, it was agreed, that Ptolemy ſhould marry her, and take her for his partner in the throne. This was accordingly done; and 19 days after the marriage, the unhappy queen was murdered by her huſband, who for 15 years afterwards ſhewed himſelf ſuch a monſter of wickedneſs, that a general inſurrection at laſt enſued among his ſubjects, and he was obliged to fly to Pompey the Great, who was then carrying on the war againſt Mithridates king of Pontus. But Pompey refuſing to concern himſelf in the matter, he retired to the city of Tyre, where he died ſome months after.

48
Marries
Cleopatra,
and mur-
ders her.

49
Leaves his
kingdom to
the Ro-
mans.

When he was forced to ſhut himſelf up in the city of Tyre, Alexander had ſent ambaſſadors to Rome, in order to influence the ſenate in his favour. But, dying before the negotiation was finiſhed, he made over by his laſt will all his rights to the Roman people, declaring them heirs to his kingdom; not out of any affection to the republic; but with a view to raiſe diſputes between the Romans and his rival Auletes, whom the Egyptians had placed on the throne. The will was brought to Rome, where it occaſioned warm debates. Some were for taking immediate poſſeſſion of the kingdom. Others thought that no notice ſhould be taken of ſuch a will, becauſe Alexander had no right to diſpoſe of his dominions in prejudice of his ſucceſſor, and to exclude from the crown thoſe who were of the royal blood of Egypt. Cicero repreſented, that ſuch a notorious impoſition would debaſe the majeſty of the Roman people, and involve them in endleſs wars and diſputes; that the fruitful fields of Egypt would be a ſtrong temptation to the avarice of the people, who would inſiſt on their being divided among them; and laſtly, that by this means the bloody quarrels about the Agrarian laws would be revived. Theſe reaſons had ſome weight with the ſenate; but what chiefly prevented them from ſeizing on Egypt at this time was, that they had lately taken poſſeſſion of the kingdom of Bithynia in virtue of the will of Nicomedes, and of Cyrene and Libya by the will of Apion. They thought therefore, that if they ſhould, on the like pretence, take poſſeſſion of the kingdom of Egypt, this might too much expoſe their deſign of ſetting up a kind of univerſal monarchy, and occaſion a formidable combination againſt them.

50 Character of Auletes the new king.

Auletes, who was now raiſed to the throne by the Egyptians, is ſaid to have ſurpaſſed all the kings that went before him in the effeminacy of his manners. The name *Auletes*, which ſignifies the *flute-player*, was given him becauſe he piqued himſelf on his ſkill in performing upon that inſtrument, and was not aſhamed even to contend for the prize in the public games. He took great pleaſure in imitating the manners of the Bacchanals; dancing in a female dreſs, and in the ſame meaſures that they uſed during the ſolemnity of their god Bacchus; and hence he had the ſurname of the *New Dionyſius* or *Bacchus*. As his title to the crown was diſputable, (he being only the ſon of a concubine), the firſt care of Auletes was to get himſelf acknowledged by the Romans, and declared their ally. This was obtained by applying to Julius Cæſar, who was at that time conſul, and immenſely in debt. Cæſar being glad of ſuch an opportunity of raiſing money, made the king of Egypt pay pretty dear for his alliance. Six thouſand talents, a ſum equal to 1,162,500 pounds Sterling, were paid partly to Cæſar himſelf, and partly to Pompey, whoſe intereſt was neceſſary for obtaining the conſent of the people. Though the revenues of Egypt amounted to twice this ſum, yet Auletes found it impoſſible for him to raiſe it without ſeverely taxing his ſubjects. This occaſioned a general diſcontent; and while the people were almoſt ready to take up arms, a moſt unjuſt decree paſſed at Rome for ſeizing the iſland of Cyprus. When the Alexandrians heard of the intentions of the republic, they preſſed Auletes to demand that iſland as an ancient appendage of Egypt; and, in caſe of a refuſal, to declare war againſt that haughty and imperious people, who, they now ſaw, though too late, aimed at nothing leſs than the ſovereignty of the world. With this requeſt the king refuſed to comply; upon which his ſubjects, already provoked beyond meaſure at the taxes with which they were loaded, flew to arms, and ſurrounded the palace. The king had the good luck to eſcape their fury, and immediately leaving Alexandria, ſet ſail for Rome.

51 Is acknowledged by the Romans.

52 Is driven from the throne, and flies to Rome.

53 Cato's advice to him.

In his way to that city, he landed on the iſland of Rhodes, where the famous Cato at that time was, being on his way to Cyprus, to put the unjuſt decree of the ſenate in execution. Auletes, deſirous to confer with a man of his prudence, immediately ſent to acquaint him with his arrival. He imagined, that, upon this notice, Cato would immediately come and wait upon him; but the proud Roman told the meſſenger, that if the king of Egypt had any thing to ſay to Cato, he might, if he thought proper, come to his houſe. Accordingly the king went to pay him a viſit; but was received with very little ceremony by Cato, who did not even vouchſafe to riſe out of his ſeat when he came into his preſence. When Auletes had laid his affairs before this haughty republican, he was blamed by him for leaving Egypt, the richeſt kingdom in the world, in order to expoſe himſelf, as he ſaid, to the indignities he would meet with at Rome. There, Cato told him, that nothing was in requeſt but wealth and grandeur. All the riches of Egypt, he ſaid, would not be ſufficient to ſatisfy the avarice of the leading men in Rome. He therefore adviſed him to return to Egypt; and ſtrive, by a more equitable conduct, to regain the affections of his people. He even offered to reconduct him thither, and employ his good offices in his behalf. But though Ptolemy was ſenſible of the propriety of this advice, the friends he had with him diſſuaded him from following it, and accordingly he ſet out for Rome.

54 Infamous conduct of Auletes.

On his arrival in this metropolis, the king found, to his great concern, that Cæſar, in whom he placed his greateſt confidence, was then in Gaul. He was received, however, by Pompey with great kindneſs. He aſſigned him an apartment in his own houſe, and omitted nothing that lay in his power to ſerve him. But, notwithſtanding the protection of ſo powerful a man, Auletes was forced to go from houſe to houſe like a private perſon, ſoliciting the votes of the ſenators. After he had ſpent immenſe treaſures in procuring a ſtrong party in the city, he was at laſt permitted to lay his complaints before the ſenate; and at the ſame time there arrived an embaſſy from the Alexandrians, conſiſting of 100 citizens, to acquaint the ſenate with the reaſons of their revolt.

55 Berenice raiſed to the throne of Egypt.

56 She marries Seleucus, and murders him.

57 Marries Archelaus.

When Auletes firſt ſet out for Rome, the Alexandrians, not knowing what was become of him, placed on the throne his daughter Berenice; and ſent an embaſſy into Syria to Antiochus Aſiaticus, inviting him into Egypt to marry the queen, and reign in partnerſhip with her. Antiochus was dead before the arrival of the ambaſſadors; upon which the ſame propoſal was made to his brother Seleucus, who readily accepted it. This Seleucus is deſcribed by Strabo as monſtrouſly deformed in body, and ſtill more ſo in mind. The Egyptians nicknamed him *Cybioſactes*, or *the Scullion*; a name which ſeemed more fit for him than any other. He was ſcarce ſettled on the throne, when he gave a ſignal inſtance of his ſordid and avaricious temper. Ptolemy the firſt had cauſed the body of Alexander the Great to be depoſited in a coffin of maſſy gold. This the king ſeized upon; and by that means provoked his wife Berenice to ſuch a degree, that ſhe cauſed him to be murdered. She then married one Archelaus, high prieſt of Comana in Pontus, who pretended to be the ſon of Mithridates the Great; but was, in fact, only the ſon of that monarch's general.

58 Auletes murders the Egyptian ambaſſadors.

Auletes was not a little alarmed on hearing of theſe tranſactions, eſpecially when the ambaſſadors arrived, who he feared would overturn all the ſchemes he had laboured ſo much to bring about. The embaſſy was headed by one Dion, a celebrated academic philoſopher, who had many powerful friends at Rome. But Ptolemy found means to get both him and moſt of his followers aſſaſſinated; and this intimidated the reſt to ſuch a degree,

gree, that they durſt not execute their commiſſion, or, for ſome time, even demand juſtice for the murder of their colleagues.

The report of ſo many murders, however, at laſt ſpread a general alarm. Auletes, ſure of the protection of Pompey, did not ſcruple to own himſelf the perpetrator of them. Nay, though an action was commenced againſt one Aſcitius an aſſaſſin who had ſtabbed Dio the chief of the embaſſy abovementioned, and the crime was fully proved; yet he was acquitted by the venal judges, who had all been bribed by Ptolemy. In a ſhort time, the ſenate paſſed a decree, by which it was enacted, that the king of Egypt ſhould be reſtored by force of arms. All the great men in Rome were ambitious of this commiſſion; which, they well knew, would be attended with immenſe profit. Their conteſts on this occaſion took up a conſiderable time; and at laſt a prophecy of the Sybil was found out, which forbad the aſſiſting an Egyptian monarch with an army. Ptolemy therefore, wearied out with ſo long a delay, retired from Rome, where he had made himſelf generally odious, to the temple of Diana at Epheſus, there to wait the deciſion of his fate. Here he remained a conſiderable time: but as he ſaw that the ſenate came to no reſolution, tho' he had ſolicited them by letters ſo to do; at laſt, by Pompey's advice, he applied to Gabinius the proconſul of Syria. This Gabinius was a man of a moſt infamous character, and ready to undertake any thing for money. Therefore, tho' it was contrary to an expreſs law for any governor to go out of his province without poſitive orders from the ſenate and people of Rome, yet Gabinius ventured to tranſgreſs this law, upon condition of being well paid for his pains. As a recompenſe for his trouble, however, he demanded 10,000 talents; that is, 1,937,500 pounds Sterling. Ptolemy, glad to be reſtored on any terms, agreed to pay the abovementioned ſum; but Gabinius would not ſtir till he had received one half of it. This obliged the king to borrow it from a Roman knight named *Caius Rabirius Poſthumius;* Pompey interpoſing his credit and authority for the payment of the capital and intereſt.

59 His reſtora- ion decreed by the ſe-nate.

60 abinius ndertakes reſtore im for a eat ſum.

Gabinius now ſet out for Egypt, attended by the famous Mark Anthony, who at this time ſerved in the army under him. He was met by Archelaus, who ſince the departure of Auletes had reigned in Egypt jointly with Berenice, at the head of a numerous army. The Egyptians were utterly defeated, and Archelaus taken priſoner in the firſt engagement. Thus Gabinius might have put an end to the war at once: but his avarice prompted him to diſmiſs Archelaus on his paying a conſiderable ranſom; after which, pretending that he had made his eſcape, freſh ſums were demanded from Ptolemy for defraying the expences of the war. For theſe ſums Ptolemy was again obliged to apply to Rabirius, who lent him what money he wanted at a very high intereſt. At laſt, however, Archelaus was defeated and killed, and thus Ptolemy again became maſter of all Egypt.

61 rchelaus feated d killed.

62 enice to th, and people preſſed.

No ſooner was Auletes firmly ſettled on the throne, than he put to death his daughter Berenice, and oppreſſed his people with the moſt cruel exactions, in order to procure the money he had been obliged to borrow while in a ſtate of exile. Theſe oppreſſions and exactions the cowardly Egyptians bore with great patience, being intimidated by the garriſon which Gabinius had left in Alexandria. But neither the fear of the Romans, nor the authority of Ptolemy, could make them put up an affront offered to their religion. A Roman ſoldier happened to kill a cat, which was an animal held ſacred and even worſhipped by the Egyptians; and no ſooner was this ſuppoſed ſacrilege known, than the Alexandrians made a general inſurrection, and, gathering together in crowds, made their way through the Roman guards, dragged the ſoldier out of his houſe, and, in ſpite of all oppoſition, tore him in pieces.

63 Ingratitude of Auletes.

Notwithſtanding the heavy taxes, however, which Ptolemy laid on his people, it doth not appear that he had any deſign of paying his debts. Rabirius, who, as we have already obſerved, had lent him immenſe ſums, finding that the king affected delays, took a voyage to Egypt, in order to expoſtulate with him in perſon. Ptolemy paid very little regard to his expoſtulations; but excuſed himſelf on account of the bad ſtate of his finances. For this reaſon he offered to make Rabirius collector-general of his revenues, that he might in that employment pay himſelf. The unfortunate creditor accepted the employment for fear of loſing his debt. But Ptolemy, ſoon after, upon ſome frivolous pretence or other, cauſed him and all his ſervants to be cloſely confined. This baſe conduct exaſperated Pompey as much as Rabirius; for the former had been in a manner ſecurity for the debt, as the money had been lent at his requeſt, and the buſineſs tranſacted at a country-houſe of his near Alba. However, as Rabirius had reaſon to fear the worſt, he took the firſt opportunity of making his eſcape, glad to get off with life from his cruel and faithleſs debtor. To complete his misfortunes, he was proſecuted at Rome as ſoon as he returned, 1. For having enabled Ptolemy to corrupt the ſenate with ſums lent him for that purpoſe. 2. For having debaſed and diſhonoured the character of a Roman knight, by farming the revenues, and becoming the ſervant of a foreign prince. 3. For having been an accomplice with Gabinius, and ſharing with him the 10,000 talents which that proconſul had received for his Egyptian expedition. By the eloquence of Cicero he was acquitted, and one of the beſt orations to be found in the writings of that author was compoſed on this occaſion. Gabinius was alſo proſecuted; and, as Cicero ſpoke againſt him, he very narrowly eſcaped death. He was, however, condemned to perpetual baniſhment, after having been ſtripped of all he was worth. He lived in exile till the time of the civil wars, when he was recalled by Cæſar, in whoſe ſervice he loſt his life.

64 Leaves his children to the care of the Romans.

Auletes enjoyed the throne of Egypt about four years after his re-eſtabliſhment; and at his death left his children, a ſon and two daughters, under the tuition of the Roman people. The name of the ſon was *Ptolemy,* thoſe of the daughters were *Cleopatra* and *Arſinoe.* This was the Cleopatra who afterwards became ſo famous, and had ſo great a ſhare in the civil wars of Rome. As the tranſactions of the preſent reign, however, are ſo cloſely connected with the affairs of Rome, that they cannot be well underſtood without knowing the ſituation of the Romans at that time, we refer for an account of them to the *Hiſtory of* ROME.

65 State of Egypt till its conqueſt by the khalif of Cairwan.

With Cleopatra ended the family of Ptolemy Lagus, the founder of the Grecian empire in Egypt, after it had held that country in ſubjection for the ſpace of 294 years. From this time Egypt became a province of the Roman empire, and continued ſubject to the emperors of Rome or Conſtantinople. In the year 642, it was conquered by the Arabs under Amru Ebn Al As, one of the generals of the Khalif Omar. In the year 889, an independent government was ſet up in this kingdom by Ahmed Ebn Tolun, who rebelled againſt Al Mokhadi khalif of Bagdad. It continued to be governed by him and his ſucceſſors for 27 years, when it was again reduced by Al Moctaſi khalif of Bagdad. In about 30 years after, we find it again an independent ſtate, being joine[illegible]th Syria under Mahomet Ebn Taj, who had been appointed governor of theſe provinces. This government, however, was alſo but ſhort-lived; for in the year 968 it was conquered by Jawhar, one of the generals of Moez Ledinillah, the Fatemite khalif of Cairwan in Barbary *.

66 Moez takes poſſeſſion of his new kingdom.

No ſooner was Moez informed of the ſucceſs of his general, than he prepared with all expedition to go and take poſſeſſion of his new conqueſt. Accordingly he ordered all the vaſt quantities of gold which he and his predeceſſors had amaſſed, to be caſt into ingots of the ſize and figure of the millſtones uſed in hand-mills, and conveyed on camels backs into Egypt. To ſhew that he was fully determined to abandon his dominions in Barbary, and to make Egypt the reſidence of himſelf and his ſucceſſors, he cauſed the remains of the three former princes of his race to be removed from Cairwan in Barbary, and to be depoſited in a ſtately moſque erected for that purpoſe in the city of Cairo in Egypt. This was a moſt effectual method to induce his ſucceſſors to reſide in Egypt alſo, as it was become an eſtabliſhed cuſtom and duty among thoſe princes frequently to pay their reſpectful viſits to the tombs of their anceſtors.

67 Will not ſuffer prayers to be ſaid for the khalif of Bagdad.

To eſtabliſh himſelf the more effectually in his new dominions, Moez ſuppreſſed the uſual prayers made in the moſques for the khalifs of Bagdad, and ſubſtituted his own name in their ſtead. This was complied with, not only in Egypt and Syria, but even throughout all Arabia, the city of Mecca alone excepted. The conſequence was, a ſchiſm in the Mahommedan faith, which continued upwards of 200 years, and was attended with continual anathemas, and ſometimes deſtructive wars between the khalifs of Bagdad and of Egypt.—Having fully eſtabliſhed himſelf in his kingdom, he died in the 45th year of his age, three years after he had left his dominions in Barbary; and was ſucceeded by his ſon Abu Al Manſur Barar, ſurnamed Aziz Billah.

68 Unſucceſsful expedition into Syria.

The new khalif ſucceeded to the throne at the age of 21; and committed the management of affairs entirely to the care of Jawhar, his father's long experienced general and prime miniſter. In 978, he ſent this famous warrior to drive out Al Aftekin, the emir of Damaſcus. The Egyptian general accordingly formed the ſiege of that place; but at the end of two months, was obliged to raiſe it, on the approach of an army of Karmatians under the command of Al Hakem. As Jawhar was not ſtrong enough to venture an engagement with theſe Karmatians, it was impoſſible for him to hinder them from effecting a junction with the forces of Al Aftekin. He therefore retreated, or rather fled, towards Egypt with the utmoſt expedition; but being overtaken by the two confederate armies, he was ſoon reduced to the laſt extremity. He was, however, permitted to reſume his march, on condition that he paſſed under Al Aftekin's ſword and Al Hakem's lance; and to this diſgraceful condition Jawhar found himſelf obliged to ſubmit. On his arrival in Egypt, he immediately adviſed Al Aziz to undertake an expedition in perſon into the eaſt, againſt the combined army of Turks, Karmatians, and Damaſcenes, under the command of Al Aftekin and Al Hakem. The khalif followed his advice; and advancing againſt his enemies, overthrew them with great ſlaughter. Al Aftekin himſelf eſcaped out of the battle; but was afterwards taken and brought to Al Aziz, who made him his chamberlain, and treated him with great kindneſs. Jawhar, in the mean time, was diſgraced on account of his bad ſucceſs; and in this diſgrace he continued till his death, which happened in the year of our Lord 990, and of the Hegira 381.

69 Aleppo beſieged without ſucceſs.

This year Al Aziz having received advice of the death of Saado'dawla prince of Aleppo, ſent a formidable army under the command of a general named *Manjubekin*, to reduce that place. Lulu, who had been appointed guardian to Saado'dawla's ſon, finding himſelf preſſed by the Egyptians, who carried on the ſiege with great vigour, demanded aſſiſtance from the Greek emperor. Accordingly, he ordered a body of troops to advance to Lulu's relief. Manjubekin, being informed of their approach, immediately raiſed the ſiege, and advanced to give them battle. An obſtinate engagement enſued, in which the Greeks were at laſt overthrown with great ſlaughter. After this victory, Manjubekin puſhed on the ſiege of Aleppo very briſkly; but finding the place capable of defending itſelf much longer than he at firſt imagined, and his proviſions beginning to fail, he raiſed the ſiege. The khalif upon this ſent him a very threatening letter, and commanded him to return before Aleppo. He did ſo; and continued the ſiege for 13 months, during all which time it was defended by Lulu with incredible bravery. At laſt, the Egyptians hearing that a numerous army of Greeks was on their way to relieve the city, they raiſed the ſiege, and fled with the utmoſt precipitation. The Greeks then took and plundered ſome of the cities which Al Aziz poſſeſſed in Syria; and Manjubekin made the beſt of his way to Damaſcus, where he ſet up for himſelf. Al Aziz being informed of this revolt, marched in perſon againſt him with a conſiderable army; but being taken ill by the way, he expired, in the 21ſt year of his reign, and 42d of his age.

Al Aziz was ſucceeded by his ſon Abu Al Manſur, ſurnamed Al Hakem; who, being only 11 years of age, was put under the tuition of an eunuch of approved integrity.

70 Strange madneſs of the khalif Al Hakem.

This reign is remarkable for nothing ſo much as the madneſs with which the khalif was ſeized in the latter part of it. This manifeſted itſelf firſt by his iſſuing many prepoſterous edicts; but at length grew to ſuch a height, that he fancied himſelf a god, and found no fewer than 16,000 perſons who owned him as ſuch. Theſe were moſtly the Dararians, a new ſect ſprung up about this time, who were ſo called from their chief, Mo-

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* See *Barbary*, nº 34.

Mohammed Ebn Iſhmael, ſurnamed Darari. He is ſuppoſed to have inſpired the mad khalif with this impious notion; and, as Darari ſet up for a ſecond Moſes, he did not ſcruple to aſſert that Al Hakem was the great Creator of the univerſe. For this reaſon, a zealous Turk ſtabbed him in the khalif's chariot. His death was followed by a three days uproar in the city of Cairo; during which, Darari's houſe was pulled down, and many of his followers maſſacred. The ſect, however, did not expire with its author. He left behind him a diſciple named Hamza, who, being encouraged by the mad khalif, ſpread it far and wide through his dominions. This was quickly followed by an abrogation of all the Mahommedan faſts, feſtivals, and pilgrimages, the grand one to Mecca in particular; ſo that the zealous Mahometans were now greatly alarmed, as juſtly ſuppoſing that Al Hakem deſigned entirely to ſuppreſs the worſhip of the true God, and introduce his own in its place. From this apprehenſion, however, they were delivered by the death of the khalif; who was aſſaſſinated, by a contrivance of his own ſiſter, in the year 1020.

Al Hakem was ſucceeded by his ſon Al Thaher, who reigned 15 years; and left the throne to a ſon under ſeven years of age, named Al Moſtanſer Billah.—In the year 1041, a revolt happened in Syria; but Al Moſtanſer having ſent a powerful army into that country, under the command of one *Anuſhtekin*, he not only reduced the rebels, but conſiderably enlarged the Egyptian dominions in Syria.

71
Al Moſtanſer attempts the conqueſt of Bagdad.

72
Khalif of Bagdad aſſiſted by Togrol Beg.

73
Bagdad taken.

In 1054, a Turk named Al Baſſaſiri, having quarrelled with the vizir of Al Kayem khalif of Bagdad, fled to Egypt, and put himſelf under the protection of Al Moſtanſer. The latter, imagining this would be a favourable opportunity for enlarging his dominions, and perhaps ſeizing on the city of Bagdad, ſupplied Baſſaſiri with money and troops. By this aſſiſtance, he was enabled to poſſeſs himſelf of Arabian Irak, and ravaged that province to the very gates of Bagdad. On this, Al Kayem wrote to Togrol Beg, or Tangrolipix, the Turkiſh ſultan, who poſſeſſed very extenſive dominions in the eaſt, to come to his aſſiſtance. The ſultan immediately complied with his requeſt, and ſoon arrived at Bagdad with a formidable army and 18 elephants. Of this Baſſaſiri gave notice to Al Moſtanſer, and intreated him to exert himſelf further for his ſupport againſt ſo powerful an enemy. This was accordingly done, but nothing worthy of notice happened till the year 1058. At this time Baſſaſiri having found means to excite Ibrahim the Sultan's brother to a revolt, Togrol Beg was obliged to employ all his force againſt him. This gave Baſſaſiri an opportunity of ſeizing on the city of Bagdad itſelf; and the unfortunate khalif, according to ſome, was taken priſoner, or, according to others, fled out of the city. Baſſaſiri, on his entry, cauſed Al Moſtanſer to be immediately proclaimed khalif in all quarters of the city. Al Kayem's vizir he cauſed to be led on a camel through the ſtreets of Bagdad, dreſſed in a woollen gown, with a high red bonnet, and a leathern collar about his neck; a man laſhing him all the way behind. Then being ſewed up in a bull's hide, with the horns placed over his head, and hung upon hooks, he was beaten without ceaſing till he died. The imperial palace was plundered, and the khalif himſelf detained a cloſe priſoner.

74
The khalif reſtored.

This ſucceſs was but ſhort-lived; for, in 1059, Togrol Beg defeated his brother Ibrahim, took him priſoner, and ſtrangled him with a bow-ſtring. He then marched to Bagdad, which Baſſaſiri thought proper to abandon at his approach. Here the khalif Al Kayem was delivered up by Mahras, the governor of a city called *Haditha*, who had the charge of him. The khalif was immediately reſtored to his dignity; which Baſſaſiri no ſooner underſtood, than he again advanced towards the city. Againſt him Togrol Beg ſent a part of his army under ſome of his generals, while he himſelf followed with the reſt. A battle enſued, in which the army of Baſſaſiri was defeated, and he himſelf killed. His head was brought to Togrol Beg, who cauſed it to be carried on a pike through the ſtreets of Bagdad.

75
Decline of the Egyptian empire.

Thus the hopes of Al Moſtanſer were entirely fruſtrated; and from this period we may date the declenſion of the Egyptian empire under the khalifs. They had made themſelves maſters of almoſt all Syria; but no ſooner was Baſſaſiri's bad ſucceſs known, than the younger part of the citizens of Aleppo revolted, and ſet up Mahmud Azzo'dawla, who immediately laid ſiege to the citadel. Al Moſtanſer ſent a powerful army againſt him, which Azzo'dawla entirely defeated, and took the general himſelf priſoner; and ſoon after this, he made himſelf maſter both of the city and citadel, with all their dependencies. In his new dominions he behaved with the greateſt cruelty, deſtroying every thing with fire and ſword, and making frequent incurſions into the neighbouring provinces, which he treated in the ſame manner.

76
Terrible famine and plague.

This diſaſter was ſoon followed by others ſtill more terrible. In 1066, a famine raged over all Egypt and Syria, with ſuch fury, that dogs and cats were ſold for four or five Egyptian dinars each, and other proviſions in proportion. Multitudes of people died in Cairo for want of food. Nay, ſo great was the ſcarcity, that the vizir had but one ſervant left who was able to attend him to the khalif's palace, and to whom he gave the care of his horſe when he alighted at the gate. But, at his return, he was ſurpriſed to find that the horſe had been carried off, killed, and eaten, by the famiſhed people. Of this he complained to the khalif; who cauſed three of them, who had carried off the horſe, to be hanged. Next day, however, he was ſtill more ſurpriſed to hear, that all the fleſh had been picked off the bones of the three unhappy criminals, ſo that nothing but the ſkeletons were left. And to ſuch a degree of miſery were the inhabitants, not only in Cairo, but through all Egypt, reduced, that the carcaſes of thoſe who died were ſold for food at a great price, inſtead of being buried. All this time the khalif ſhewed the greateſt kindneſs and beneficence towards his unhappy ſubjects, inſomuch, that of 10,000 horſes, mules, and camels, which he had in his ſtables when the famine began, he had only three left when it was removed.

77
Invaded by the Turks.

The famine was followed by a plague; and this by an invaſion of the Turks under Abu Ali Al Haſan Naſerod'dawla, the very general who had been ſent againſt the rebel Azzo'dawla and defeated by him. He began with beſieging the khalif in his own palace; and the unhappy prince, being in no condition to make reſiſtance, was obliged to buy himſelf off at the expence of every thing valuable that was left in his exhauſted capital and treaſury. This, however, did not hinder theſe mercileſs plunderers from ravaging all the lower Egypt from Cairo to Alexandria, and committing the moſt horrid cruelties through that whole tract. —This happened in the years 1067 and 1068; and in 1069 and 1070, there happened two other revolts in Syria: ſo that this country was now almoſt entirely loſt.

78 Jeruſalem taken.

In 1095 died the khalif Al Moſtanſer, having reigned 60 years; and was ſucceeded by his ſon Abul Kaſem, ſurnamed Al Moſtali.—The moſt remarkable tranſaction of this prince's reign, was his taking the city of Jeruſalem from the Turks in 1098: but this ſucceſs was only of ſhort duration; for it was, the ſame year, taken by the cruſaders.

79 A revolution in the kingdom.

From this time to the year 1164, the Egyptian hiſtory affords little elſe than an account of the inteſtine broils and conteſts between the vizirs or prime miniſters, who were now become ſo powerful, that they had in a great meaſure ſtripped the khalifs of their civil power, and left them nothing but a ſhadow of ſpiritual dignity. Theſe conteſts at laſt gave occaſion to a revolution, by which the race of Fatemite khalifs was totally extinguiſhed. This revolution was accompliſhed in the following manner.—One *Shawer*, having overcome all his competitors, became vizir to Al Aded, the eleventh khalif of Egypt. He had not been long in poſſeſſion of this office, when Al Dargam, an officer of rank, endeavoured to deprive him of it. Both parties quickly had recourſe to arms; and a battle enſued, in which Shawer was defeated, and obliged to fly to Nuroddin prince of Syria, by whom he was graciouſly received, and who promiſed to reinſtate him in his office of vizir. As an inducement to Nuroddin to aſſiſt him more powerfully, Shawer told him that the cruſaders had landed in Egypt, and made a conſiderable progreſs in the conqueſt of it. He promiſed alſo, that, in caſe he was reinſtated in his office, he would pay Nuroddin annually the third part of the revenues of Egypt; and would, beſides, defray the whole expence of the expedition.

As Nuroddin bore an implacable hatred to the Chriſtians, he readily undertook an expedition againſt them, for which he was to be ſo well paid. He therefore ſent an army into Egypt under the command of Shawer and a general named *Aſadoddin*. Dargam, in the mean time, had cut off ſo many generals whom he imagined favourable to Shawer's intereſt, that he thereby weakened the military force of the kingdom, and in a great meaſure deprived himſelf of the power of reſiſtance. He was therefore eaſily overthrown by Aſadoddin, and Shawer reinſtated in the office of vizir. The faithleſs miniſter, however, no ſooner ſaw himſelf firmly eſtabliſhed in his office, than he refuſed to fulfil his engagements to Nuroddin by paying the ſtipulated ſums. Upon this, Aſadoddin ſeized Peluſium and ſome other cities. Shawer then entered into an alliance with the Cruſaders, and Aſadoddin was beſieged by their combined forces in Peluſium. Nuroddin, however, having invaded the Chriſtian dominions in Syria, and taken a ſtrong fortreſs called *Harem*, Shawer and his confederates thought proper to hearken to ſome terms of accommodation, and Aſadoddin was permitted to depart for Syria.

In the mean time, Nuroddin, having ſubdued the greateſt part of Syria and Meſopotamia, reſolved to make Shawer feel the weight of his reſentment, on account of his perfidious conduct. He therefore ſent back Aſadoddin into Egypt with a ſufficient force, to compel Shawer to fulfil his engagements: but this the vizir took care to do before the arrival of Aſadoddin; and thus, for the preſent, avoided the danger. It was not long, however, before he gave Nuroddin freſh occaſion to ſend this general againſt him. That prince had now driven the cruſaders almoſt entirely out of Syria, but was greatly alarmed at their progreſs in Egypt; and conſequently offended at the alliance which Shawer had concluded with them, and which he ſtill perſiſted in obſerving. This treaty was alſo thought to be contrived on purpoſe to prevent Shawer from being able to fulfil his promiſe to Nuroddin, of ſending him annually a third of the revenues of Egypt. Nuroddin therefore again diſpatched Aſadoddin into Egypt, in the year 1166, with a ſufficient force, and attended by the famous Salahaddin, or Saladin, his own nephew. They entered the kingdom without oppoſition, and totally defeated Shawer and the cruſaders. They next made themſelves maſters of Alexandria; and, after that, overran all the Upper Egypt. Saladin was left with a conſiderable garriſon in Alexandria; but Aſadoddin was no ſooner gone, than the cruſaders laid ſiege to that city. This at laſt obliged Aſadoddin to return to its relief. The great loſſes he had ſuſtained in this expedition probably occaſioned his agreeing to a treaty with Shawer, by which he engaged to retire out of Egypt, upon being paid a ſum of money.

Aſadoddin was no ſooner gone, than Shawer entered into a freſh treaty with the Franks. By this new alliance he was to attack Nuroddin in his own dominions, as he was at that time engaged in quelling ſome revolters, which would effectually prevent his ſending any more forces into Egypt. This treaty ſo provoked the Syrian prince, that he reſolved to ſuſpend his other conqueſts for ſome time, and exert his whole ſtrength in the conqueſt of Egypt.

80 Conqueſts of the cruſaders.

By this time the cruſaders had reduced Peluſium, and made a conſiderable progreſs in the kingdom, as well as in ſome other countries, through the diviſions which reigned among the Mahometan princes. In ſuch places as they conquered, they put almoſt every body to the ſword, Chriſtians as well as Mahometans; ſelling their priſoners for ſlaves, and giving up the towns to be plundered by the ſoldiers. From Peluſium they marched to Cairo; which was then in no poſture of defence, and in the utmoſt confuſion, by reaſon of the diviſions which reigned in it. Shawer, therefore, as ſoon as he heard of their approach, cauſed the ancient quarter called *Meſr* to be ſet on fire, and the inhabitants to retire into the other parts. He alſo prevailed upon the khalif to ſolicit the aſſiſtance of Nuroddin; which the latter was indeed pretty much inclined of himſelf to grant, as it gave him the faireſt opportunity he could have wiſhed for, both of driving the cruſaders out of Egypt, and of ſeizing the kingdom to himſelf. For this purpoſe he had already raiſed an army of 60,000 horſe under his general Aſadoddin; and, on the receipt of Al Aded's meſſage, gave them orders to ſet out immediately. The cruſaders were now arrived at Cairo; and had ſo cloſely beſieged that place, that neither Shawer nor the khalif knew any thing of the approach of the Moſlem army which was haſtening to their relief. The vizir therefore, finding it impoſſible to hold out long againſt the enemy, had recourſe to his old ſubterfuge of treaties and high promiſes. He ſent the enemy 100,000 dinars, and promiſed them 900,000 more, if they would raiſe the ſiege; which they, dreading the approach of Aſadoddin, very readily accepted.

81 They are repulſed by the army of Nuroddin prince of Damaſcus.

The army of Nuroddin now approached the capital by haſty marches, and were every where received with the greateſt demonſtrations of joy. Aſadoddin, on his arrival at Cairo, was invited by Al Aded to the royal palace, where he was entertained in the moſt magnificent manner, and received ſeveral preſents; nor were Saladin and the other principal officers leſs magnificently treated. Shawer alſo, conſcious of his perfidious conduct, was no leſs aſſiduous in attending punctually upon him. But having invited the general and ſome others to an entertainment, he had formed a ſcheme of having them ſeized and murdered. The plot, however, being diſcovered, Shawer himſelf had his head cut off, and Aſadoddin was made vizir in his ſtead. He did not, however, long enjoy his new dignity; for he died two months and five days after his inſtalment, being ſucceeded in his office of vizir by his nephew Saladin.

82 Saladin becomes vizir of Egypt.

The new vizir was the youngeſt of all the grandees who aſpired to that office, but had already given ſome ſignal proofs of his valour and conduct. What determined the khalif to prefer him to all the reſt is not known; but it is certain that ſome of them were highly diſpleaſed with his promotion, and even publicly declared that they would not obey him. In order to gain theſe to his intereſt, therefore, Saladin found it neceſſary to diſtribute among them part of the vaſt treaſures left by his uncle; by which means he ſoon governed Egypt without controul, as had been cuſtomary with the vizirs for ſome time before. Soon after his being inſtalled into the office of vizir, he gave a total defeat to the negroes who guarded the royal palace, and had oppoſed his election; by which means, and a ſtrong garriſon he had placed in the caſtle of Cairo, his power became firmly eſtabliſhed. Though he had not the leaſt intention of continuing in his allegiance to Nuroddin, he did not think it prudent at firſt to declare himſelf. He ſent for his father, however, and the reſt of his family, who were in Nuroddin's dominions, in order, as he ſaid, to make them partakers of his grandeur and happineſs. Nuroddin did not think proper to deny this requeſt; though, being already jealous of the great power of Saladin, he inſiſted that his family ſhould conſider him only as one of his generals in Egypt.

A good underſtanding ſubſiſted between Nuroddin and Saladin for ſome time, which did not a little contribute to raiſe the credit of the latter with the Egyptians. In 1169, Nuroddin ſent him orders to omit the name of Al Aded, the khalif of Egypt, in the public prayers, and ſubſtitute that of the khalif of Bagdad in its place. This was at any rate a dangerous attempt; as it might very readily produce a revolt in favour of Al Aded; or if it did not, it gave Saladin an opportunity of engroſſing even that ſmall remnant of power which was left to the khalif. Al Aded, however, was not ſenſible of his diſgrace; for he was on his death-bed, and paſt recovery, when Nuroddin's orders were executed. After his death, Saladin ſeized on all his wealth and valuable effects; which conſiſted of jewels of prodigious ſize, ſumptuous furniture, a library containing 100,000 volumes, &c. His family he cauſed to be cloſely confined in the moſt private and retired part of the palace; and either manumitted his ſlaves, or kept them for himſelf, or diſpoſed of them to others.

83 Seizes the effects of the khalif.

Saladin was now arrived at the higheſt pitch of wealth, power, and grandeur. He was, however, obliged to behave with great circumſpection with regard to Nuroddin; who ſtill continued to treat him as his vaſſal, and would not ſuffer him to diſpute the leaſt of his commands. He relied for advice chiefly on his father Ayub; who was a conſummate politician, and very ambitious of ſeeing his ſon raiſed to the throne of Egypt. He therefore adviſed Saladin to continue ſtedfaſt in his reſolutions; and, whilſt he amuſed Nuroddin with feigned ſubmiſſions, to take every method in his power to ſecure himſelf in the poſſeſſion of ſo valuable a kingdom. Nuroddin himſelf, however, was too great a maſter in the art of diſſimulation to be eaſily impoſed on by others; and therefore, though he pretended to be well pleaſed with Saladin's conduct, he was all this time raiſing a powerful army, with which he was fully determined to invade Egypt the following year. But while he meditated this expedition, he was ſeized with a quinſy at the caſtle of Damaſcus, which put an end to his life, in the year 1173.

84 Aſpires to the crown.

Saladin, though now freed from the apprehenſions of ſuch a formidable enemy, dared not venture to aſſume the title of *Sovereign*, while he ſaw the ſucceſſor of Nuroddin at the head of a very powerful army, and no leſs deſirous than able to diſpoſſeſs him. For this reaſon his firſt care was to ſecure to himſelf an aſylum, in caſe he ſhould be obliged to leave Egypt altogether. For this purpoſe he choſe the kingdom of Nubia; but having diſpatched his brother Malek Turanſhah thither, at the head of a conſiderable army, the latter was ſo much ſtruck with the ſterility and deſolate appearance of the country, that he returned without attempting any thing. Saladin then ſent his brother into Arabia Felix, in order to ſubdue that country, which had been for ſome time held by Abdalnabi an Arabian prince. Malek entered the country without oppoſition; and having brought Abdalnabi to a general action, entirely defeated him, took him priſoner, and threw him into irons. He then over-ran and reduced under ſubjection to Saladin great part of the country, taking no fewer than 80 caſtles or fortreſſes of conſiderable ſtrength.

85 Subdues Arabia Felix.

86 Aſſumes the title of ſultan.

After this good fortune, Saladin, now ſure of a convenient place of refuge in caſe of any misfortune, aſſumed the title of *Sultan* or ſovereign of Egypt; and was acknowledged as ſuch by the greater part of the ſtates. The zeal of the Egyptians for the Fatemite khalifs, however, ſoon produced a rebellion. One *Al Kanz*, or *Kanzanaddowla*, governor of a city in Upper Egypt, aſſembled a great army of blacks, or rather ſwarthy natives; and marching directly into the lower country, was there joined by great numbers of other Egyptians. Againſt them Saladin diſpatched his brother Malek, who ſoon defeated and entirely diſperſed them. This, however, did not prevent another inſurrection under an impoſtor, who pretended to be David the ſon of Al Aded the laſt Fatemite khalif, and had collected a body of 100,000 men. But before

fore theſe had time to do any great damage, they were ſurpriſed by the ſultan's forces, and entirely defeated. Above 3000 were publicly hanged, and a vaſt number periſhed in the field, inſomuch that it was thought ſcarce a fourth part of the whole body eſcaped.

About this time Saladin gained a conſiderable advantage over the cruſaders, commanded by William II. king of Sicily. That prince had invaded Egypt with a numerous fleet and army, with which he laid cloſe ſiege to Alexandria both by ſea and land. Saladin, however, marched to the relief of the city with ſuch ſurpriſing expedition, that the cruſaders were ſeized with a ſudden panic, and fled with the utmoſt precipitation, leaving all their military engines, ſtores, and baggage behind.

87
Saladin made ſovereign of Damaſcus.

In the year 1175, the inhabitants of Damaſcus begged of Saladin to accept the ſovereignty of that city and its dependencies; being jealous of the miniſter, who had the tuition of the reigning prince, and who governed all with an abſolute ſway. The application was no ſooner made, than the ſultan ſet out with the utmoſt celerity to Damaſcus, at the head of a choſen detachment of 700 horſe. Having ſettled his affairs in that city, he appointed his brother Saif Al Iſlam governor of it; and ſet out for Hems, to which he immediately laid ſiege. Having made himſelf maſter of this place, he then proceeded to Hamah. The city very ſoon ſurrendered, but the citadel held out for ſome time. Saladin pretended that he accepted the ſovereignty of Damaſcus and the other places he had conquered, only as deputy to Al Malec Al Saleh, the ſucceſſor of Nuroddin, and who was then under age; and that he was deſirous of ſending Azzoddin, who commanded in the citadel, with a letter to Aleppo, where the young prince reſided. This ſo pleaſed Azzoddin, that he took the oath of fidelity to Saladin, and immediately ſet out with the ſultan's letter. He had not, however, been long at Aleppo before he was by the miniſter's orders thrown into priſon; upon which, his brother, who had been appointed governor of the citadel Hamah in his abſence, delivered it up to Saladin without further ceremony. The ſultan then marched to Aleppo, with a deſign to reduce it; but, being vigorouſly repulſed in ſeveral attacks, he was at laſt obliged to abandon the enterpriſe. At the ſame time, Kamſchlegin, Al Malec's miniſter or vizir, hired the chief of the Bataniſts, or Aſſaſſins *, to murder him. Several attempts were made in conſequence of this application; but all of them, happily for Saladin, miſcarried.

88
Defeats his enemies.

After raiſing the ſiege of Aleppo, Saladin returned to Hems, which place the cruſaders had inveſted. On his approach, however, they thought proper to retire; after which, the ſultan made himſelf maſter of the ſtrong caſtle belonging to that place, which, before, he had not been able to reduce. This was ſoon followed by the reduction of Baalbec; and theſe rapid conqueſts ſo alarmed the miniſters of Al Malek, that, entering into a combination with ſome of the neighbouring princes, they raiſed a formidable army with which they deſigned to cruſh the ſultan at once. Saladin, fearing the event of a war, offered to cede Hems and Hamah to Al Malec, and to govern Damaſcus only as his lieutenant: but theſe terms being rejected, a battle enſued; in which the allied army was utterly defeated, and the ſhattered remains of it ſhut up in the city of Aleppo. This produced a treaty, by which Saladin was left maſter of all Syria, excepting only the city of Aleppo and the territory belonging to it.

89
Receives a terrible overthrow from the cruſaders.

In 1176 Saladin returned from the conqueſt of Syria, and made his triumphal entry into Cairo. Here, having reſted himſelf and his troops for ſome time, he began to encompaſs the city with a wall 29,000 cubits in length, but which he did not live to finiſh. Next year he led a very numerous army into Paleſtine againſt the cruſaders. But here his uſual good fortune failed him. His army was entirely defeated. Forty thouſand of his men were left dead on the field; and the reſt fled with ſo much precipitation, that, having no towns in the neighbourhood where they could ſhelter themſelves, they traverſed the vaſt deſart between Paleſtine and Egypt, and ſcarce ſtopped till they reached the capital itſelf. The greateſt part of the army by this means periſhed; and as no water was to be had in the deſart abovementioned, almoſt all the beaſts died of thirſt, before the fugitives arrived on the confines of Egypt. Saladin himſelf ſeemed to have been greatly intimidated; for in a letter to his brother Al Malek, he told him, that "he was more than once in the moſt imminent danger; and that God, as he apprehended, had delivered him from thence, in order to reſerve him for the execution of ſome grand and important deſign."

In the year 1182, the ſultan ſet out on an expedition to Syria with a formidable army, amidſt the acclamations and good wiſhes of the people. He was, however, repulſed with loſs both before Aleppo and Al Mawſel, after having ſpent much time and labour in beſieging theſe two important places.

90
The Chriſtians receive a great defeat at ſea.

In the mean time, a moſt powerful fleet of European ſhips appeared on the Red Sea, which threatened the cities of Mecca and Medina with the utmoſt danger. The news of this armament no ſooner reached Cairo, than Abu Becr, Saladin's brother, who had been left viceroy in the ſultan's abſence, cauſed another to be fitted out with all ſpeed under the command of Lulu, a brave and experienced officer; who quickly came up with them, and a dreadful engagement enſued. The Chriſtians were defeated after an obſtinate reſiſtance, a vaſt number of their men were killed in the engagement, and all the priſoners butchered in cold blood. This proved ſuch a terrible blow to the Europeans, that they never more ventured on a like attempt.

91
Saladin's rapid conqueſts.

In 1183, Saladin continued to extend his conqueſts. The city of Amida in Meſopotamia ſurrendered to him in eight days; after which, being provoked by ſome violences committed by the prince of Aleppo, he reſolved at all events to make himſelf maſter of that place. He was now attended with better ſucceſs than formerly; for as his army was very numerous, and he puſhed on the ſiege with the utmoſt vigour, Amadoddin the prince capitulated, upon condition of being allowed to poſſeſs certain cities in Meſopotamia which had formerly belonged to him, and being ready to attend the ſultan on whatever expedition he pleaſed. After the conqueſt of Aleppo, Saladin took three other cities, and then marched againſt his old enemies the Cruſaders. Having ſent out a party to reconnoitre the enemy, they fell in with a conſiderable detachment of Chriſtians; whom they eaſily defeated, taking about 100 priſoners, with the loſs of only a ſingle man on

their

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* See *Aſſaſſin.*

Egypt.

their ſide. The ſultan, animated by this firſt inſtance of ſucceſs, drew up his forces in order of battle, and advanced againſt the Cruſaders, who had aſſembled their whole army at Sepphoris in Galilee. On viewing the ſultan's troops, however, and perceiving them to be greatly ſuperior in ſtrength to what they had at firſt apprehended, they thought proper to decline an engagement, nor could Saladin with all his ſkill force them to it. But though it was found impoſſible to bring the Cruſaders to a deciſive engagement, Saladin found means to harraſs them greatly, and deſtroyed great numbers of their men. He carried off alſo many priſoners, diſmantled three of their ſtrongeſt cities, laid waſte their territories, and concluded the campaign with taking another ſtrong town.

92 riſtians ally de- ted.

For three years Saladin continued to gain ground on the Cruſaders, yet without any deciſive advantage; but in 1187, the fortune of war was remarkably unfavourable to them. The Chriſtians now found themſelves obliged to venture a battle, by reaſon of the cruel ravages committed in their territories by Saladin, and by reaſon of the encroachments he daily made on them. Both armies therefore being reſolved to exert their utmoſt efforts, a moſt fierce and bloody battle enſued. Night prevented victory from declaring on either ſide, and the fight was renewed with equal obſtinacy next day. The victory was ſtill left undecided; but, the third day, the ſultan's men finding themſelves ſurrounded by the enemy on all ſides but one, and there alſo hemmed in by the river Jordan, ſo that there was no room to fly, fought like men in deſpair, and at laſt gained a moſt complete victory. Vaſt numbers of the Chriſtians periſhed on the field. A large body found means to retire in ſafety to the top of a neighbouring hill covered with wood; but being ſurrounded by Saladin's troops, who ſet fire to the wood, they were all obliged to ſurrender at diſcretion. Some of them were butchered by their enemies as ſoon as they delivered themſelves into their hands, and others thrown into irons. Among the latter were the king of Jeruſalem himſelf, Arnold prince of Al Shawbec and Al Carac, the maſters of the Templers and Hoſpitalers, with almoſt the whole body of the latter. So great was the conſternation of the Chriſtians on this occaſion, that one of Saladin's men is ſaid to have taken 30 of them priſoners, and tied them together with the cord of his tent, to prevent them from making their eſcape. The maſters of the Templars and Hoſpitalers, with the knights acting under them, were no ſooner brought into Saladin's preſence, than he ordered them all to be cut in pieces. He called them *Aſſaſſins*, or *Bataniſts*; and had been wont to pay 50 dinars for the head of every Templar or Hoſpitaler that was brought him. After the engagement, Saladin ſeated himſelf in a magnificent tent, placing the king of Jeruſalem on his right hand, and Arnold prince of Al Shawbec and Al Carac on his left. Then he drank to the former, who was at that time ready to expire with thirſt, and at the ſame time offered him a cup of ſnow-water. This was thankfully received; and the king immediately drank to the prince of Al Carac, who ſat near him. But here Saladin interrupted him with ſome warmth: "I will not, ſays he, ſuffer this curſed rogue to drink; as that, according to the laudable and generous cuſtom of the Arabs, would ſecure to him his life." Then, turning towards the prince, he reproached him with having undertaken the expedition while in alliance with himſelf, with having intercepted an Egyptian caravan in the time of profound peace, and maſſacring the people of which it was compoſed, &c. Notwithſtanding all this, he told him, he would grant him his life, if he would embrace Mahometaniſm. This condition, however, was refuſed; and the ſultan, with one ſtroke of his ſcymitar, cut off the prince's head. This greatly terrified the king of Jeruſalem; but Saladin aſſured him he had nothing to fear, and that Arnold had brought on himſelf a violent death by his want of common honeſty.

93 His further conqueſts.

The Cruſaders being thus totally defeated and diſperſed, Saladin next laid ſiege to Tiberias, which capitulated in a ſhort time. From thence he marched towards Acca or Ptolemais, which likewiſe ſurrendered after a ſhort ſiege. Here he found 4000 Mahometan priſoners in chains, whom he immediately releaſed. As the inhabitants enjoyed at preſent a very extenſive trade, the place being full of merchants, he found there not only vaſt ſums of money, but likewiſe a great variety of wares exceedingly valuable, all which he ſeized and applied to his own uſe. About the ſame time his brother Al Malec attacked and took a very ſtrong fortreſs in the neighbourhood; after which the ſultan divided his army into three bodies, that he might with the greater facility over-run the territories of the Chriſtians. Thus, in a very ſhort time, he made himſelf maſter of Neapolis, Cæſarea, Sepphoris, and other cities in the neighbourhood of Ptolemais, where his ſoldiers found only women and children, the men having been all killed or taken priſoners. His next conqueſt was Joppa, which was taken by ſtorm after a vigorous reſiſtance. Every thing being then ſettled, and a diſtribution made of the ſpoils and captives, Saladin marched in perſon againſt Tebrien, a ſtrong fortreſs in the neighbourhood of Sidon; which was taken by aſſault, after it had ſuſtained a ſiege of ſix days. No ſooner was he maſter of this place, than he ordered the fortreſs to be razed, and the garriſon put to the ſword. From Tebrien the victorious ſultan proceeded to Sidon itſelf; which, being deſerted by its prince, ſurrendered almoſt on the firſt ſummons. Berytus was next inveſted, and ſurrendered in ſeven days. Among the priſoners Saladin found in this place the prince of a territory called *Hobeil*, who by way of ranſom delivered up his dominions to him, and was of conſequence releaſed. About the ſame time, a Chriſtian ſhip, in which was a nobleman of great courage and experience in war, arrived at the harbour of Ptolemais, not knowing that it was in the hands of Saladin. The governor might eaſily have ſecured the veſſel; but neglecting the opportunity, ſhe eſcaped to Tyre, where the abovementioned nobleman, together with the prince of Hobeil, contributed not a little to retrieve the affairs of the Chriſtians, and enable them to make a ſtand for four years after.

94 Jeruſalem taken.

Saladin in the mean time went on with his conqueſts. Having made himſelf maſter of Aſcalon after a ſiege of 14 days, he next inveſted Jeruſalem. The garriſon was numerous, and made an obſtinate defence; but Saladin having at laſt made a breach in the walls by ſapping, the beſieged deſired to capitulate. This was at firſt refuſed, upon which the Chriſtian ambaſſador made the following ſpeech. "If that be the caſe, know, O ſultan, that we who are extremely numerous, and have been reſtrained from fighting like men in deſpair only by the hopes of an honourable capitulation, will kill all our wives and children, commit all our wealth and valuable effects to the flames, maſſacre 5000 priſoners now in our hands, leave not a ſingle beaſt of burden or animal of any kind belonging to us alive, and level with the ground the rock you eſteem ſacred, together with the temple Al Akſa. After this we will ſally out upon you in a body; and doubt not but we ſhall either cut to pieces a much greater number of you than we are, or force you to abandon the ſiege." This deſperate ſpeech had ſuch an effect upon Saladin, that he immediately called a council of war, at which all the general officers declared, that it would be moſt proper to allow the Chriſtians to depart unmoleſted. The ſultan therefore allowed them to march out freely and ſecurely with their wives, children, and effects; after which he received ten dinars from every man capable of paying that ſum, five from every woman, and two from every young perſon under age. For the poor who were not able to pay any thing, the reſt of the inhabitants raiſed the ſum of 30,000 dinars.

Moſt of the inhabitants of Jeruſalem were eſcorted by a detachment of Saladin's troops to Tyre; and ſoon after, he advanced with his army againſt that place. As the port was blocked up by a ſquadron of five men of war, Saladin imagined that he ſhould eaſily become maſter of it. But in this he found himſelf miſtaken. For, one morning by break of day, a Chriſtian fleet fell upon his ſquadron, and entirely defeated it; nor did a ſingle veſſel eſcape their purſuit. A conſiderable number of the Mahometans threw themſelves into the ſea during the engagement; moſt of whom were drowned, though ſome few eſcaped. About the ſame time Saladin himſelf was vigorouſly repulſed by land; ſo that, after calling a council of war, it was thought proper to raiſe the ſiege.

In 1188, Saladin, though his conqueſts were not ſo rapid and conſiderable as hitherto, continued ſtill ſuperior to his enemies. He reduced the city of Laodicea and ſome others, together with many ſtrong caſtles; but met alſo with ſeveral repulſes. At laſt he took the road to Antioch; and having reduced all the fortreſſes that lay in his way, many of which had been deemed impregnable, Bohemond prince of Antioch was ſo much intimidated, that he deſired a truce for ſeven or eight months. This Saladin found himſelf obliged to comply with, on account of the prodigious fatigues his men had ſuſtained, and becauſe his auxiliaries now demanded leave to return home.

95
Cruſaders retrieve their affairs.

All theſe heavy loſſes of the Chriſtians, however, proved in ſome reſpects an advantage, as they were thus obliged to lay aſide their animoſities, which had originally proved the ruin of their affairs. Thoſe who had defended Jeruſalem, and moſt of the other fortreſſes taken by Saladin, having retreated to Tyre, formed there a very numerous body. This proved the means of preſerving that city, and alſo of re-eſtabliſhing their affairs for the preſent. For, having received powerful ſuccours from Europe, they were enabled in 1189 to take the field with 30,000 foot and 2000 horſe. Their firſt attempt was upon Alexandretta; from whence they diſlodged a ſtrong party of Mahometans, and made themſelves maſters of the place with very little loſs. They next laid ſiege to Ptolemais; of which Saladin had no ſooner received intelligence, than he marched to the relief of the place. After ſeveral ſkirmiſhes with various ſucceſs, a general engagement enſued, in which Saladin was defeated with the loſs of 10,000 men. This enabled the Chriſtians to carry on the ſiege of Ptolemais with greater vigour; which place, however, they were not able to reduce for the ſpace of two years.

This year the ſultan was greatly alarmed by an account that the emperor of Germany was advancing to Conſtantinople with an army of 260,000 men, in order to aſſiſt the other Cruſaders. This prodigious armament, however, came to nothing. The multitude was ſo reduced with ſickneſs, famine, and fatigue, that ſcarce 1000 of them reached the camp before Ptolemais. The ſiege of that city was continued, though with bad ſucceſs on the part of the Chriſtians. They were repulſed in all their attacks, their engines were burnt with naphtha, and the beſieged always received ſupplies of proviſions in ſpite of the utmoſt efforts of the beſiegers; at the ſame time that a dreadful famine and peſtilence raged in the Chriſtian camp, which ſometimes carried off 200 people a-day.

96
Richard I. of Englan arrives in Aſia.

In 1191, the Chriſtians received powerful ſuccours from Europe. Philip II. of France, and Richard I. of England (from his great courage ſurnamed *Cœur de Lion)*, arrived before the camp at Ptolemais. The latter was eſteemed the braveſt and moſt enterpriſing of all the generals the Cruſaders had, and the ſpirits of his ſoldiers were greatly elated by the thoughts of acting under ſuch an experienced commander. Soon after his arrival, the Engliſh ſunk a Mahometan ſhip of vaſt ſize, having on board 650 ſoldiers, a great quantity of arms and proviſions, going from Berytus to Ptolemais. Of the ſoldiers and ſailors who navigated this veſſel, only a ſingle perſon eſcaped; who being taken priſoner by the Engliſh, was diſpatched to the ſultan with the news of the diſaſter. The beſieged ſtill defended themſelves with the greateſt reſolution; and the king of England happening to fall ſick, the operations of the beſiegers were conſiderably delayed. On his recovery, however, the attacks were renewed with ſuch fury, that the place was every moment in danger of being taken by aſſault. This induced them to ſend a letter to Saladin, informing him, that if they did not receive ſuccours the very next day, they would be obliged to ſubmit. As this town was the ſultan's principal magazine of arms, he was greatly affected with the account of their diſtreſs, eſpecially as he found it impoſſible to relieve them. The inhabitants, therefore, found themſelves under a neceſſity of ſurrendering the place. One of the terms of the capitulation was, that the Cruſaders ſhould receive a very conſiderable ſum of money from Saladin, in conſequence of their delivering up the Mahometan priſoners they had in their hands. This article, Saladin refuſed to comply with; and in conſequence of his refuſal, Richard cauſed 3000 of thoſe unfortunate men to be ſlaughtered at once.

After the reduction of Ptolemais, the king of England, now made generaliſſimo of the Cruſaders, took the road to Aſcalon, in order to beſiege that place; after which, he intended to make an attempt upon Jeruſalem itſelf. Saladin propoſed to intercept his paſſage,

97
efeats Sa-
din.

ſage, and placed himſelf in the way with an army of 300,000 men. On this occaſion was fought one of the greateſt battles of that age. Saladin was totally defeated, with the loſs of 40,000 men; and Aſcalon ſoon fell into the hands of the Cruſaders. Other ſieges were afterwards carried on with ſucceſs, and Richard even approached within ſight of Jeruſalem, when he found, that, by reaſon of the weakened ſtate of his army, and the diviſions which prevailed among the officers who commanded it, he ſhould be under the neceſſity of concluding a truce with the ſultan. This was accordingly done in the year 1192; the term was, three years, three months, three weeks, three days, and three hours; ſoon after which the king of England ſet out on his return to his own dominions.

98
amlucs
come ma-
rs of E-
pt.

In 1193, Saladin died, to the inexpreſſible grief of all true Mahometans, who held him in the utmoſt veneration. His dominions in Syria and Paleſtine were ſhared out, among his children and relations, into many petty principalities: his ſon Othman ſucceeded to the crown of Egypt; but as none of his ſucceſſors poſſeſſed the enterpriſing genius of Saladin, the hiſtory from that time to the year 1250 affords nothing remarkable. At this time the reigning ſultan Malek Al Salek was dethroned and ſlain by the *Mamlucs* or *Mamelucs*, as they are called, a kind of mercenary ſoldiers who ſerved under him. In conſequence of this revolution, the Mamelucs became maſters of Egypt, and choſe a ſultan from among themſelves.—Theſe Mamelucs were originally young Turks or Tartars, ſold to private perſons by the merchants, from whom they were bought by the ſultan, educated at his expence, and employed to defend the maritime places of the kingdom. The reaſon of this inſtitution originally was, that the native Egyptians were become ſo cowardly, treacherous, and effeminate, from a long courſe of ſlavery, that they were unfit for arms. The Mamelucs, on the contrary, made moſt excellent ſoldiers; for, having no friends but among their own corps, they turned all their thoughts to their own profeſſion. When they had got poſſeſſion of the government, therefore, as they neither underſtood nor valued any thing beſides the art of war, every ſpecies of learning decayed in Egypt, and a great degree of barbariſm was introduced. Neither was their empire of long duration, notwithſtanding all their martial abilities. The reaſon of this was, that they were originally only a ſmall part of the ſultan of Egypt's ſtanding forces. As a numerous ſtanding army was neceſſary in a country where the fundamental maxim of government was, that every native muſt be a ſlave, they were at firſt at a loſs how to act; being juſtly ſuſpicious of all the reſt of the army. At laſt they reſolved to buy Chriſtian ſlaves, and educate them in the ſame way that they themſelves had formerly been. Theſe were commonly brought from Circaſſia, where the people, though they profeſſed Chriſtianity, made no ſcruple of ſelling their children. When they were completed in their military education, theſe ſoldiers were diſpoſed of through all the fortreſſes erected in the country to bridle the inhabitants; and becauſe in their language ſuch a fort was called *Borge*, the new militia obtained the name of *Borgites*. By this expedient the Mamelucs imagined they would be able to ſecure themſelves in the ſovereignty. But in this they were miſtaken. In proceſs of time, the old Mamelucs grew proud, inſolent, and lazy; and the Borgites, taking advantage of this, roſe upon their maſters, deprived them of the government, and transferred it to themſelves about the year 1382.

99
Driven out by the Borgites.

100
Egypt conquered by Selim.

The Borgites, as well as the former, aſſumed the name of *Mamelucs;* and were famous for their valour, and ferocity of conduct. They were almoſt perpetually engaged in wars either foreign or domeſtic, and their dominion laſted till the year 1517, when their kingdom was invaded by Selim the Turkiſh ſultan. The Mamelucs defended themſelves with incredible valour; notwithſtanding which, being overpowered by numbers, they were defeated in every engagement. The ſame year, their capital, the city of Cairo, was taken, with a terrible ſlaughter of thoſe who defended it. The ſultan was forced to fly; and, having collected all his force, ventured another battle. The moſt romantic efforts of valour, however, were inſufficient to cope with the innumerable multitude which compoſed the Turkiſh army. Moſt of his men were cut in pieces, and the unhappy prince himſelf was at laſt obliged to take ſhelter in a marſh. He was dragged from his hiding place, where he had ſtood up to the ſhoulders in water, and ſoon after put to death. With him ended the glory, and almoſt the exiſtence, of the Mamelucs, who were now every where ſearched for and cut in pieces.

101
His horrid cruelty.

This was the laſt great revolution in the Egyptian affairs; a revolution very little to the advantage of the natives, who may well doubt whether their ancient or modern conquerors have behaved with the greater degree of barbarity. Selim gave a ſpecimen of his government, the very day after his being put in full poſſeſſion of it by the death of Tuman Bey the unfortunate ſultan above mentioned. Having ordered a theatre to be erected with a throne upon it on the banks of the Nile, he cauſed all the priſoners, upwards of 30,000 in number, to be beheaded in his preſence, and their bodies thrown into the river. The reſt of the Turkiſh government hath been conformable to ſuch a beginning; and the inhabitants are ſtill oppreſſed by exactions, and reduced to the loweſt degree of ſlavery.

102
Different accounts concerning the country of Egypt.

103
Its fertility, to what owing.

With regard to the country of Egypt, it is difficult to ſay any thing with certainty; for not only is there a prodigious difference between the accounts of the ancient and modern hiſtorians, but the latter differ very widely from one another. According to the former, the country abounded with grain of all ſorts, eſpecially rice. The moſt fertile parts were the Delta, now called *Al Feyyum*. The capital of this diſtrict is by the natives ſaid to have been built by the patriarch Joſeph, to whom they own themſelves obliged for the improvement of this territory. Before his time it was nothing but a ſtanding pool; but that patriarch, by cutting canals, particularly the great one which reaches from the Nile to the lake Mœris, drained it of the water, and, clearing it of the weeds and ruſhes, made it fit for tillage. It ſtill continues to be the moſt fertile and beſt cultivated part of the kingdom. The great fertility of Egypt was attributed, and very juſtly, to the annual overflowing of the Nile; for the overflowing of grounds with water is found to be a very good method of fertilizing them *. The ſources of this river were unknown to the ancients. They even thought it impoſ-

* See *Agriculture*, n° 18, 19.

poſſible to diſcover them. It is now, however, known, that the Nile ariſes in Ethiopia or Abyſſinia. It enters Egypt almoſt under the tropic of Cancer, violently pouring down no leſs than ſeven cataracts from a very conſiderable height, and making a noiſe that may be heard ſeveral miles off. Having paſſed through the Upper and Middle Egypt, a little below the ancient Memphis, it divided itſelf into two large arms, which afterwards formed ſeven channels, by which it was diſcharged into the ſea. Theſe ſeven mouths are much ſpoken of by ancient hiſtorians. They were called the *Canopic*, the *Heracleotic*, *Bolbitic*, *Sebennytic*, *Phatnic* or *Pathmetic*, the *Mendeſian Tanitic* or *Saitic*, and the *Peluſian*; all of which had their names from cities ſtanding on their ſeveral branches. Beſides theſe, there were two Pſeudoſtomata, or falſe mouths, named *Pineptimi* and *Diolcos*, which were too ſmall for large veſſels. But the greater part of theſe mouths have been ſince ſtopped up, and others formed; ſo that above thirty channels are now reckoned, through which the waters of the Nile empty themſelves into the ſea, eſpecially at the time of its overflowing, the greater part of them becoming dry when the waters retire. The two chief, and indeed the only conſiderable branches of the Nile at preſent are thoſe of *Roſetta* or *Raſhid* to the weſt, and *Damietta* or *Dimyet* to the eaſt.

104 Account of the river Nile.

105 Its annual inundation.

Concerning the annual inundation of the Nile, ancient and modern writers agree pretty well. It begins to riſe about the ſummer ſolſtice, and continues to do ſo for about 100 days after; then it gradually decreaſes for as many more, till it retires within its banks, and does not overflow till the next year. If the river does not riſe to the height of 15 or 16 cubits at leaſt, the country is not covered with water, and a ſcarcity enſues. No notice is taken of the riſing of the river till the end of June; by which time it is uſually riſen to the height of ſix or eight *pikes*, (a Turkiſh meaſure of about 26 inches). Then the public criers proclaim it through all the cities; and in the ſame manner continue every day to give an account of its gradual progreſs. After it has riſen to the height of 16 pikes, they cut down the dam of a great canal which paſſes through the middle of the city of Cairo, and let in the water on their lands. If the river want but an inch of this height, they will not cut the dam; becauſe, in ſuch a caſe, no tribute is due to the prince for the lands that ſhould have been watered by them, the produce being then ſcarce ſufficient to maintain the tillers. For this reaſon, if the baſhaw or governor of Egypt cut this dam before the river has riſen to the height above mentioned, he is anſwerable for the conſequence, and muſt pay the Turkiſh emperor his tribute, whether the year prove plentiful or not. If the water riſes to the height of 23 or 24 pikes, it is thought to be the moſt favourable; but if it exceeds that, it does a great deal of miſchief, by overthrowing houſes, drowning cattle, &c.

106 Account of the nilometers.

In order to judge more exactly of the riſe and fall of the water, pillars are erected on its banks, and marked with proper diviſions. A very ancient one, ſaid to be erected for this purpoſe by the emperor Heraclius, is ſtill to be ſeen in the caſtle of old Cairo. The preſent *nilometer*, or *mikyas*, as the Arabs call it, is in the ſame caſtle. It is a large ſquare reſervoir, round which runs a handſome gallery ſuſtained by 12 marble pillars, with a balluſtrade to lean on, when one looks into the water. Through this baſon runs a canal drawn from the river. In the middle is an octagonal pillar of white marble divided into 22 equal parts: the firſt is divided into 24 inches; but the ſecond is not; tho' all the reſt have theſe ſubdiviſions.

107 Method of diſtributin the water.

As it is impoſſible, however, that the Nile can of itſelf overflow every ſpot of land which requires its aſſiſtance, the inhabitants have been obliged to cut a vaſt number of canals and trenches from one end of Egypt to the other, to convey the water to thoſe places where it is wanted. Every town and village has its canal; which is opened at the moſt proper time, and the water conducted to the moſt diſtant places. Theſe canals are not permitted to be opened all at once; becauſe, if this was done, ſome lands would have too much, and others too little, water. They begin to open them firſt in upper Egypt, and then gradually lower, according to the public regulations made for that purpoſe. By this means, the water is ſo carefully huſbanded, that it anſwers the purpoſes of the whole country; which is ſo large, and the canals ſo numerous, that, it is thought, ſcarce a tenth part of the waters of the river enter the ſea during the firſt three months of its overflowing. As ſome places, however, lie too high to be overflowed in this manner, they are for this reaſon obliged to raiſe the water to cover them by engines. Formerly, they made uſe of Archimedes's ſcrew, from thence commonly called the *Egytian pump*: but now they generally uſe wheels, which draw up the water in earthen pots, and are moved by oxen. There is alſo a vaſt number of wells, from whence water is drawn in the ſame manner for the gardens and fruit-trees; ſo that there are reckoned to be 200,000 oxen daily employed in this labour throughout the kingdom; without reckoning the men who draw water in wicker-baſkets ſo cloſe that not a drop runs through.

108 Prodigious fertility of ancient Egypt.

The accounts given by the ancients of the fertility of Egypt, almoſt exceed the bounds of credibility. The mud or ſlime brought down by the river, according to them, was in quantity ſufficient to ſerve for manure to the whole kingdom. They had not the toil of digging, ploughing, or breaking of clods. When the waters were retired, they needed only to mix a little ſand with the earth to abate its ſtrength; the mud brought down by the Nile making the ſoil, it ſeems, too rich; after which, they ſowed their ſeed, and reaped the moſt plentiful crops.—We can ſcarce doubt that this formerly hath been true in ſome degree, ſeeing we find it atteſted by all the hiſtorians of antiquity, that, in the time of the Romans, their city was chiefly ſupplied with corn from Egypt. From the way in which it is ſpoke of in the ſacred writings alſo, we muſt certainly look upon Egypt to have anciently been a very plentiful country.

109 Modern Egypt not fertile.

Now, however, the caſe is prodigiouſly altered. The inhabitants are ſcarce one twentieth part of what they formerly were, and every ſpot is cultivated as much as before; yet the country very ſeldom produces enough to ſupport them. The waters of the Nile now bring down none of that mud ſpoke of by the ancients. They continue clear from the beginning of their riſe till they have arrived at the height of 17 feet and upwards. Then they bring down a quantity of reddiſh coloured loam, which indeed proves an excellent manure. It is very probable, therefore, that the ſources from whence the waters of the Nile received the black mud, have long ſince been exhauſted; and the inhabitants not adverting to this change, and neglecting to manure their lands properly, the ground hath been exhauſted by continual cultivation, and fallen ſhort of its ancient fertility*.—What fertility this country ſtill poſſeſſes, muſt be derived from the waters of the river, ſeeing leſs crops are always produced when the waters of the Nile riſe to the leaſt height. One thing which contributes greatly to the variation of quantity in the waters of the Nile, and conſequently of the fertility of the country, is the blowing of the north-wind. This makes a kind of bar acroſs the mouths of the river, and hinders the waters from flowing with ſuch ſwiftneſs into the ſea as they otherwiſe would do: and therefore it is obſerved, that when the wind blows from any other quarter, the waters decreaſe as much in one day, as they do in four when it blows from the north; and hence, in ſuch caſes, the fertility of Egypt is greatly diminiſhed.—The ancients were ignorant of the cauſes of this inundation, which ſeemed to them the more unaccountable, as it overflowed in the ſummer-time, when other rivers are generally at the loweſt. But it has long ſince been known to be occaſioned by the great rains which fall in Ethiopia in April and May, and ſwell the river to ſuch a degree, that it almoſt lays that country entirely under water. At the ſame time, it rains with equal regularity in the Eaſt Indies, and the rivers Indus and Ganges overflow their banks at the ſame time with the Nile.

Whatever may have been the caſe with the fertility of ancient Egypt, it is certain, that ſuch monuments of the power and wealth of its ancient monarchs remain, that we cannot doubt of its having been anciently very populous.—The moſt remarkable of theſe are the pyramids; which, on many accounts, may be reckoned the moſt wonderful ſtructures in the world. There are many of them in the different parts of Egypt; but thoſe which have been chiefly taken notice of and deſcribed by travellers, ſtand on the weſt ſide of the Nile, not far from the ancient Memphis. The number of theſe pyramids is about 20; of which three, ſtanding almoſt together, are moſt remarkable, and have been moſt frequently deſcribed. The others lie ſcattered in the Libyan deſart, and are leſſer models of theſe three, though ſome of them alſo are very conſiderable. —The builders of theſe pyramids are unknown. Joſephus ſuppoſes them to have been erected by the Iſraelites during their heavy oppreſſion by Pharaoh. Others pretend, that they were built by the patriarch Joſeph, for granaries to lay up the corn of the ſeven plentiful years: both of which opinions, however, ſeem to be improbable. It is much more likely, that they were erected as monuments for the dead.

110 count of pyra- ds.

The firſt of theſe pyramids is ſituated on a rocky hill, in the ſandy deſart of Libya, about a quarter of a mile from the plains of Egypt; above which, the rock riſes 100 feet or more, with a gentle and eaſy aſcent. Upon this advantageous riſe and ſolid foundation is the pyramid erected; the height of the ſituation adding to the beauty of the work, and the ſolidity of the rock affording it a ſtable ſupport. The north ſide, near the baſis, being meaſured by a radius of 10 feet in length, taking two ſeveral ſtations, was found by Mr Greaves to be 693 Engliſh feet. The other ſides were examined by a line, for want of an even level, and a convenient diſtance to place the inſtruments. The altitude, if meaſured by its perpendicular, is 481 feet; but if it be taken as the pyramid aſcends inclining, then it is equal, in reſpect of the lines ſubtending the ſeveral angles, to the latitude of the baſis. Whereby it appears, that though ſeveral of the ancients have exceſſively magnified the height of theſe pyramids, yet the biggeſt of them falls ſhort of the height of St Paul's church in London: which, from the ground to the top of the lanthorn only, is no leſs than 470 feet. If we imagine on the ſides of the baſis, which is perfectly ſquare, four equilateral triangles mutually inclining till they meet in a point (for ſo the top ſeems to thoſe who ſtand below), then we ſhall have a juſt idea of the true dimenſions and figure of this pyramid; the area of whoſe baſis contains 480,249 ſquare feet, or ſomething more than 11 Engliſh acres of ground: a proportion ſo monſtrous, that did not the ancients atteſt as much, and ſome of them more, it might appear incredible.

The aſcent to the top of the pyramid is contrived by ſteps, the lowermoſt of which is near four feet in height, and three in breadth; and running about the pyramid in a level, made a narrow walk, when the ſtones were entire, on every ſide. The ſecond ſtep is like the firſt, benching in near three feet. In the ſame manner is the third row placed on the ſecond; and the reſt in order, like ſo many ſtairs, riſing one above another to the top; which ends not in a point, as mathematical pyramids do, but in a little flat or ſquare of 13,280 Engliſh feet broad, and conſiſting of nine ſtones, beſides two which are wanting at the corners. This pyramid, by reaſon of the ſtones being worn by the weather, cannot be conveniently aſcended, except on the ſouth ſide, or at the north-eaſt angle. The ſteps are made of maſſy and poliſhed ſtones (ſaid to have been hewn out of the Arabian mountains, which bound the upper Egypt on the eaſt); and are ſo vaſt, that the breadth and depth of every ſtep is one ſingle ſtone. It is alſo to be obſerved, that the ſteps are not all of equal depth; for ſome are near four feet, and others not quite three, diminiſhing the higher one aſcends: and the breadth of them is proportionable to their depth; ſo that a right line, extended from the baſis to the top, will equally touch the outward angle of every ſtep. The number of theſe ſteps is not mentioned by any of the ancients; but modern travellers differ very much in their computation. Mr Greaves and two others counted them very carefully, and found them to be 207; though one of them, in deſcending, reckoned 208.

The entrance into the pyramid is by a ſquare narrow paſſage, which opens in the midſt of the north ſide on the 16th ſtep, or aſcending 38 feet, on an artificial bank of earth. The ſtone that is over it is near 12 feet long, and above 8 feet wide. This entry goes declining with an angle of 26 degrees, and is in breadth exactly 3,463 Engliſh feet, and in length 92 feet and an half. The ſtructure of it has been the labour of an exquiſite hand, as appears by the ſmoothneſs and evenneſs of the work, and cloſe knitting of the joints; a property long ſince obſerved by Diodorus to have run through the whole fabric of this pyramid. At the end of this paſſage there is another like the former, but which goes on a little riſing: at the meeting of theſe

two

* See *Agriculture*, n° 25,--28.

two paſſages, the one deſcending and the other aſcending, the lowermoſt ſtone of the roof, perpendicular to it, forms a ſharp ridge, between which and the ſand there is ſometimes not a foot ſpace to paſs through; ſo that a man muſt ſlide on his belly cloſe to the ground, and yet grate his back againſt the above-mentioned ſtone, unleſs he be very ſlender. However, this difficulty is occaſioned chiefly by the ſand which the wind drives into this place; for if the paſſage be cleared, it is of the ſame dimenſions there as at the entrance. There being no window or other opening in this pyramid to admit the light, it may eaſily be conceived, that thoſe who would view the inſide muſt carry lights with them.

Having paſſed this ſtrait, on the right hand there is an ugly broken hole of about 89 feet in length, the height and breadth various, and not worthy conſideration: whether this part be decayed by time, or has been dug away for curioſity, or in hopes of diſcovering ſome hidden treaſure, is uncertain. On the left hand, adjoining to the narrow entrance, climbing up a ſteep and maſſy ſtone 8 or 9 feet in height, one enters on the lower end of the firſt gallery; the pavement of which riſes with a gentle acclivity, conſiſting of a ſmooth poliſhed marble, and, where not ſmeared with duſt and filth, appearing of a white and alabaſter colour; the ſides and roof of unpoliſhed ſtone, not ſo hard and compact as that of the pavement: the breadth of this gallery is almoſt 5 feet, the height about as much, and the length 110 feet. At the end of it, there are two paſſages; one low and horizontal, or level with the ground; and the other high and riſing like the former. At the entry of the lower paſſage, on the right hand, is the well mentioned by Pliny, which is circular, and a little above 3 feet diameter: the ſides are lined with white marble, and the deſcent is by fixing the hands and feet in little open ſpaces cut in the ſides within, oppoſite and anſwering to one another in a perpendicular; which is the contrivance for deſcending into moſt of the wells and ciſterns at Alexandria. This well might lead to the vault above-mentioned; but it is now almoſt ſtopped up with rubbiſh, and not above 20 feet deep.

Leaving the well, and going ſtrait on to the diſtance of 15 feet, one enters another paſſage opening againſt the former, and of the ſame dimenſions, the ſtones of which are very maſſy, and exquiſitely joined. This paſſage runs in a level 110 feet, and leads to an arched vault, or chamber, ſtanding due eaſt and weſt, having a ſepulchral ſmell, and half full of rubbiſh; its length is not quite 20 feet, its breadth about 17, and its height leſs than 15; the walls are entire, and plaſtered over with lime; the roof is covered with large ſmooth ſtones, not lying flat, but ſhelving, and meeting above in an angle. On the ſide of this room, in the middle of it, Greaves ſays, there ſeems to have been a paſſage leading to ſome other place; but neither Thevenot nor Le Brun could diſcover any ſuch.

Returning back through the narrow horizontal paſſage, you climb over it, and enter into the other or ſecond gallery on the left, divided from the firſt gallery by the wall, in which is the entrance to the laſt-mentioned paſſage. This ſecond gallery riſes with an angle of 26 degrees, and is in length 154 feet from the well below; but if meaſured on the pavement, ſomewhat leſs, by reaſon of a little vacuity of about 15 feet, before deſcribed, between the well and the ſquare-hole: the height of it is about 26 feet, and the breadth 6.87 feet; of which one half is to be allowed for the way in the midſt, there being a ſtone bench on each ſide of the wall, of one foot and $\frac{717}{1000}$ in breadth, and as much in depth. On the top of theſe benches, near the angle where they cloſe with the wall, are little ſpaces, cut in right-angled parallel figures, ſet in each ſide oppoſite to one another; intended, no queſtion, for ſome other end than ornament. The ſtone of which this gallery is built, is a white and poliſhed marble, very evenly cut in large tables; and the joints are ſo cloſe, that they are ſcarce diſcernable by a curious eye: but what adds grace to the whole ſtructure, though it makes the paſſage the more ſlippery and difficult, is the acclivity and riſing of the aſcent. However, the going up is not a little facilitated by certain holes made in the floor, about ſix hands-breadth from one another, into which a man may ſet his feet, while he holds by the bench with one hand. In the ranging of the marble tables in both the ſide-walls, there is one piece of architecture very graceful; and that is, that all the courſes, which are but ſeven, do ſet and flag over one another about three inches, the bottom of the upper courſe overſetting the higher part of the next below it in order as they deſcend.

Having paſſed this gallery, one enters another ſquare hole of the ſame dimenſions with the former, which leads into two ſmall antichambers or cloſets, lined with a rich and ſpeckled kind of Thebaic marble. The firſt of theſe is almoſt equal to the ſecond, which is of an oblong figure; one ſide containing ſeven feet, and the other three and a half; the height is ten feet, and the floor level. On the eaſt and weſt ſides, within two feet and a half of the top, which is ſomewhat larger than the bottom, are three ſemicircular cavities, or little ſeats.

The inner antichamber is ſeparated from the former by a ſtone of red ſpeckled marble, which hangs in two mortiſes (like the leaf of a ſluice), between two walls, more than three feet above the pavement, and wanting two of the roof. From this ſecond cloſet you enter another ſquare hole, over which are five lines cut parallel and perpendicular; beſides which no other ſculptures or engravings are obſerved in the whole pyramid. The ſquare paſſage is of the ſame wideneſs with the reſt, being all of Thebaic marble, exquiſitely cut, and landing you at the north end of a very ſumptuous and well proportioned room. The diſtance from the end of the ſecond gallery to this entry, running upon the ſame level, is 24 feet. This chamber ſtands as it were in the heart and centre of the pyramid, equidiſtant from all the ſides, and almoſt in the midſt between the baſis and the top. The floor, the ſides, and the roof of it, are all made of vaſt tables of Thebaic marble, moſt exquiſitely poliſhed; which, if they were not obſcured by the ſmoke of torches, would appear gliſtering and ſhining. From the top of it deſcending to the bottom, there are about ſix ranges of ſtone, all of which being reſpectively ſized to an equal height very gracefully run round the room in one altitude. The ſtones which cover this chamber are of a ſtupendous length, like as many huge beams lying flat and traverſing the room, and ſupporting the prodigious maſs of building above. Of theſe there are nine which cover the roof;

two of them are leſs by half in breadth than the reſt; the one at the eaſt end, and the other at the weſt. The length of the chamber on the ſouth ſide, moſt accurately taken at the joint or line where the firſt and ſecond row of ſtones meet, is 34.38 Engliſh feet; the breadth on the weſt ſide, at the joint where the firſt and ſecond row of ſtones meet, is 1.719 feet; and the height 19½ feet.

Within this room ſtands the monument of *Cheops*, or *Chemmis*, of one piece of marble, hollow within, and ſounding like a bell. It is of the ſame kind of ſtone with which the whole room is lined; being a ſpeckled marble with white, black, and red ſpots. The figure of the tomb is like an altar, or two cubes finely ſet together; it is cut ſmooth and plain, without any ſculpture or engraving. The outward ſuperficies is in length ſeven feet three inches and a half, and in depth three feet three inches and three quarters. The hollow inſide is in length, on the weſt ſide, 6.488 feet; in breadth, at the north end, 2.218 feet; and in depth, 2.860 feet. As this monument could not have been brought hither through the above-mentioned narrow paſſages, it is ſuppoſed to have been raiſed and placed there before the roof of the chamber was cloſed. It ſtands exactly in the meridian, or due north and ſouth, and equidiſtant from all the ſides of the chamber, except the eaſt, from whence it is twice as far removed as from the reſt. Under it there is a little hollow ſpace dug away, and a large ſtone in the pavement removed at the angle next adjoining to it: which hath probably been done in hopes of finding ſome treaſure hidden there; it being a ſuperſtitious prodigality practiſed by the ancients, and continued to this day in the Eaſt Indies, to conceal money in their ſepulchres. In the ſouth and north ſides of the chamber there are two inlets oppoſite to one another, ſeven tenths of a foot broad, four tenths of a foot deep, evenly cut, and running in a ſtraight line ſix feet and further into the thickneſs of the wall: that on the ſouth ſide is larger and ſomewhat round, not ſo long as the former, and by the thickneſs within ſeems to have been made uſe of for ſetting of lamps upon it. This is all that is to be ſeen within this firſt pyramid. The only thing more to be obſerved is a ſurpriſing echo, which Plutarch takes notice of, and ſays, that it anſwers four or five times; but a late traveller (Lucas) aſſures us that it anſwers ten or twelve times very diſtinctly.

The ſecond pyramid ſtands at a ſmall diſtance ſouthward from the former. Mr Greaves aſſures us, that it is of the ſame dimenſions. It has no paſſage into it; and is built of white ſtones, not near ſo large as the firſt. The ſides riſe not with ſteps like the firſt, but are ſmooth and equal; the whole fabric, except where it is oppoſed to the ſouth, being very entire, and free from any deformed breaches. The third pyramid is much leſs than the two foregoing ones, meaſuring only 300 feet on each ſide. It is built of a clear and white ſtone, ſomewhat brighter than that of which the ſecond is built. Beſides theſe, there is alſo a fourth; which, had it it been finiſhed, would not have fallen ſhort of the grandeur of the firſt. It has 148 ſteps like the firſt. The platform is not even, the ſtones being ſet together without order, which ſhews that it has not been finiſhed; and yet it is much more ancient than any of the reſt, as is evident by the ſtones, which are all worn out and crumbled into ſand. It has a paſſage into it which leads into ſome halls and galleries like thoſe of the firſt.

Beſides theſe, there are many other monuments of the grandeur of the ancient Egyptian monarchs; ſome of which are mentioned under the article ARCHITECTURE, n° 4. and others under thoſe of THEBES, MÆRIS, SYENE, &c.

111
Account of the inhabitants.

With regard to the inhabitants of Egypt, it hath already been obſerved, that they are much leſs numerous than formerly; owing, no doubt, to the rigour of the Turkiſh government. The deſcendents of the original Egyptians are an ill-looked ſlovenly people, immerſed in indolence, and are diſtinguiſhed by the name of *Coptis;* in their complexions they are rather ſun-burnt than ſwarthy or black. Their anceſtors were once Chriſtians, and in general they ſtill pretend to be of that religion; but Mahometaniſm is the prevailing worſhip of Egypt. Thoſe who inhabit the villages and fields, at any conſiderable diſtance from the Nile, conſiſt of Arabs or their deſcendants, who are of a deep ſwarthy complexion; and they are repreſented by the beſt travellers, as ſtill retaining the patriarchal method of tending their flocks, and many of them without any fixed place of abode. The Turks, who reſide in Egypt, retain all their Ottoman pride and inſolence, and the Turkiſh habit, to diſtinguiſh themſelves from the Arabs and Coptis, who dreſs very plain, their chief finery being an upper garment of white linen, and linen drawers; but their ordinary dreſs is of blue linen, with a long cloth coat, either over or under it. The Chriſtians and Arabs of the meaner kind content themſelves with a linen or woollen wrapper, which they fold, blanket-like, round their body. The Jews wear blue leather ſlippers, the other natives of the country wear red, and the foreign Chriſtians yellow. The dreſs of the women is tawdry and unbecoming; but their cloaths are ſilk when they can afford it; and ſuch of them as are not expoſed to the ſun, have delicate complexions and features. The Copts in general are excellent accomptants, and many of them live by teaching the other natives to read and write. All Egypt is over-run with jugglers, fortune-tellers, mountebanks, and travelling ſleight-of-hand men.

112
Their religion.

To what we have already ſaid concerning the religion of Egypt, it is proper to add, that the bulk of the Mahometans are enthuſiaſts, and have among them their ſantos or fellows who pretend to a ſuperior degree of holineſs, and without any ceremony intrude into the beſt houſes, where it would be dangerous to turn them out. The Egyptian Turks mind religious affairs very little; and it would be hard to ſay what ſpecies of Chriſtianity is profeſſed by the Chriſtian Copts, which are here numerous; but they profeſs themſelves to be of the Greek church, and enemies to that of Rome. In religious, and indeed in many civil matters, they are under the juriſdiction of the patriarch of Alexandria, who by dint of money generally purchaſes a protection at the Ottoman court.

113
Language.

The Coptic is the moſt ancient language of Egypt. This was ſucceeded by the Greek, about the time of Alexander the Great; and that by the Arabic, upon the commencement of the khalifate, when the Arabs diſpoſſeſſed the Greeks of Egypt. The Arabic, or Arabeſque, as it is called, is ſtill the current lanbe out of the power of that attracting force whereby they cohere; they muſt certainly, on the ceſſation of the external violence, ſpring back to their former natural ſtate.

Others reſolve elaſticity into the preſſure of the atmoſphere: for a violent tenſion, or compreſſion, tho' not ſo great as to ſeparate the conſtituent particles of bodies far enough to let in any foreign matter, muſt yet occaſion many little vacuola between the ſeparated ſurfaces; ſo that upon the removal of the force they will cloſe again, by the preſſure of the aerial fluid upon the external parts. See Atmosphere.

Laſtly, others attribute the elaſticity of all hard bodies to the power of reſilition in the air included within them; and ſo make the elaſtic force of the air, the principle of elaſticity in all other bodies.

The Elasticity *of Fluids* is accounted for from their particles being all endowed with a centrifugal force; when Sir Iſaac Newton, prop. 23. lib. 2. demonſtrates, that particles, which mutually avoid or fly off from one another by ſuch forces as are reciprocally proportioned to the diſtances of their centre, will compoſe an elaſtic fluid, whoſe denſity ſhall be proportional to its compreſſion; and *vice verſa*, if any fluid be compoſed of particles that fly off and avoid one another, and hath its denſity proportional to its compreſſion, then the centrifugal forces of thoſe particles will be reciprocally as the diſtances of their centres.

Elasticity *of the Air*, is the force wherewith that element dilates itſelf, upon removing the force whereby it was before compreſſed *.

* See *Air*, and *Atmoſphere*.

The elaſticity or ſpring of the air, was firſt diſcovered by Galileo. Its exiſtence is proved by this experiment of that philoſopher: An extraordinary quantity of air, being intruded by means of a ſyringe into a glaſs or metal ball, till ſuch time as the ball, with this acceſſion of air, weigh conſiderably more in the balance than it did before; upon opening the mouth thereof, the air ruſhes out, till the ball ſink to its former weight. From hence we argue, that there is juſt as much air gone out, as compreſſed air had been crowded in. Air, therefore, returns to its former degree of expanſion, upon removing the force that compreſſed or reſiſted its expanſion; conſequently it is endowed with an elaſtic force. It muſt be added, that as the air is found to ruſh out in every ſituation or direction of the orifice, the elaſtic force acts every way, or in every direction.

The elaſticity of the air makes a conſiderable article in Pneumatics.

The cauſe of the elaſticity of the atmoſphere hath been commonly aſcribed to a repulſion between its particles; but this can give us only a very ſlight idea of the nature of its elaſticity. The term *repulſion*, like that of *attraction*, requires to be defined, and in all probability will be found in moſt caſes to be the effect of the action of ſome other fluid. Thus, we find, that the elaſticity of the atmoſphere is very conſiderably affected by heat. Thus, ſuppoſing a quantity of air heated to ſuch a degree as is ſufficient to raiſe Fahrenheit's thermometer to 212, it will then occupy a conſiderable ſpace. If it is cooled to ſuch a degree as to ſink the thermometer to 0, it will ſhrink up into leſs than half the former bulk. The quantity of repulſive power therefore acquired by the air, while paſſing from one of theſe ſtates to the other, is evidently owing to the heat added to or taken away from it. Nor have we any reaſon to ſuppoſe, that the quantity of elaſticity or repulſive power it ſtill poſſeſſes is owing to any other thing than the fire contained in it. The ſuppoſing repulſion to be a primary cauſe independent of all others, hath given riſe to many erroneous theories, and been one very great mean of embarraſſing philoſophers in their accounting for the phenomena of Electricity.

ELATER, in zoology, a genus of inſects, belonging to the order of coleoptera. The feelers are ſetaceous. There are 38 ſpecies, diſtinguiſhed by their colour, &c.

ELATERIUM. See Pharmacy, n° 602.

ELBE, a large river in Germany, which, riſing on the confines of Sileſia, runs through Bohemia, Saxony, and Brandenburg; and afterwards dividing the duchy of Lunenburg from that of Mecklenburg, as alſo the dutchy of Bremen from Holſtein, it falls into the German ocean, about 70 miles below Hamburgh. It is navigable for great ſhips higher than any river in Europe.

ELCESAITES, in church-hiſtory, ancient heretics, who made their appearance in the reign of the emperor Trajan, and took their name from their leader Elceſai. The elceſaites kept a mean between the Jews, Chriſtians, and Pagans; they worſhipped but one God, obſerved the Jewiſh ſabbath, circumciſion, and the other ceremonies of the law. They rejected the Pentateuch, and the prophets; nor had they any more reſpect for the writings of the apoſtles, particularly thoſe of St Paul.

ELDERS, or Seniors, in Jewiſh hiſtory, were perſons the moſt conſiderable for age, experience, and wiſdom. Of this ſort were the 70 men whom Moſes aſſociated to himſelf in the government of his people; ſuch, likewiſe, afterwards were thoſe who held the firſt rank in the ſynagogue, as preſidents.

In the firſt aſſemblies of the primitive Chriſtians, thoſe who held the firſt place were called *elders*. The word *preſbyter*, often uſed in the New Teſtament, is of the ſame ſignification: hence the firſt councils of Chriſtians were called *preſbyteria*, or *councils of elders*.

Elder is alſo a denomination preſerved in the preſbyterian diſcipline. See Presbyterian.

Elder, or *Alder*, in botany. See Alnus.

ELECAMPANE, in botany. See Inula.

ELECT, among eccleſiaſtical writers, thoſe whom God has choſen, or predeſtinated to be ſaved. See Predestination.

ELECTION, the choice that is made of a perſon, or thing, in preference of any other.

Election, in theology, ſignifies the choice which God makes of angels and men for the objects of his grace and mercy. See Grace, and Predestination.

Election, in Britiſh polity, is the people's choice of their repreſentatives in parliament. (See Parliament.) In this conſiſts the exerciſe of the democratical part of our conſtitution: for in a democracy there can be no exerciſe of ſovereignty but by ſuffrage, which is the declaration of the people's will. In all democracies, therefore, it is of the utmoſt importance to regulate by whom, and in what manner, the ſuffrages

Election.

Blackſt. Comment.

ges are to be given. And the Athenians were ſo juſtly jealous of this prerogative, that a ſtranger, who interfered in the aſſemblies of the people, was puniſhed by their laws with death; becauſe ſuch a man was eſteemed guilty of high treaſon, by uſurping thoſe rights of ſovereignty to which he had no title. In Britain, where the people do not debate in a collective body, but by repreſentation, the exerciſe of this ſovereignty conſiſts in the choice of repreſentatives. The laws have therefore very ſtrictly guarded againſt uſurpation or abuſe of this power, by many ſalutary proviſions; which may be reduced to theſe three points, 1. The qualifications of the electors. 2. The qualifications of the elected. 3. The proceedings at elections.

(1.) As to the qualifications of the electors. The true reaſon of requiring any qualification, with regard to property, in voters, is to exclude ſuch perſons as are in ſo mean a ſituation, that they are eſteemed to have no will of their own. If theſe perſons had votes, they would be tempted to diſpoſe of them under ſome undue influence or other. This would give a great, an artful, or a wealthy man, a larger ſhare in elections than is conſiſtent with general liberty. If it were probable that every man would give his vote freely, and without influence of any kind; then, upon the true theory and genuine principles of liberty, every member of the community, however poor, ſhould have a vote in electing thoſe delegates, to whoſe charge is committed the diſpoſal of his property, his liberty, and his life. But, ſince that can hardly be expected in perſons of indigent fortunes, or ſuch as are under the immediate dominion of others, all popular ſtates have been obliged to eſtabliſh certain qualifications; whereby ſome, who are ſuſpected to have no will of their own, are excluded from voting, in order to ſet other individuals, whoſe wills may be ſuppoſed independent, more thoroughly upon a level with each other.

And this conſtitution of ſuffrages is framed upon a wiſer principle, with us, than either of the methods of voting, by centuries or by tribes, among the Romans. In the method by centuries, inſtituted by Servius Tullius, it was principally property, and not numbers, that turned the ſcale: in the method by tribes, gradually introduced by the tribunes of the people, numbers only were regarded, and property entirely overlooked. Hence the laws paſſed by the former method had uſually too great a tendency to aggrandize the patricians or rich nobles; and thoſe by the latter had too much of a levelling principle. Our conſtitution ſteers between the two extremes. Only ſuch are entirely excluded, as can have no will of their own: there is hardly a free agent to be found, but what is entitled to a vote in ſome place or other in the kingdom. Nor is comparative wealth, or property, entirely diſregarded in elections; for though the richeſt man has only one vote at one place, yet, if his property be at all diffuſed, he has probably a right to vote at more places than one, and therefore has many repreſentatives. This is the ſpirit of our conſtitution: not that we aſſert it is in fact quite ſo perfect as we have here endeavoured to deſcribe it; for, if any alteration might be wiſhed or ſuggeſted in the preſent frame of parliaments, it ſhould be in favour of a more complete repreſentation of the people.

But to return to the qualifications; and firſt thoſe of electors for knights of the ſhire. 1. By ſtatute 8 Hen. VI. c. 7. and 10 Hen. VI. c. 2. (amended by 14 Geo. III. c. 58.) the knights of the ſhire ſhall be choſen of people, whereof every man ſhall have freehold to the value of forty ſhillings by the year within the county; which (by ſubſequent ſtatutes) is to be clear of all charges and deductions, except parliamentary and parochial taxes. The knights of ſhires are the repreſentatives of the landholders, or landed intereſt of the kingdom: their electors muſt therefore have eſtates in lands or tenements, within the county repreſented. Theſe eſtates muſt be freehold, that is, for term of life at leaſt; becauſe beneficial leaſes for long terms of years were not in uſe at the making of theſe ſtatutes, and copyholders were then little better than villeins, abſolutely dependent upon their lords. This freehold muſt be of 40 ſhillings annual value; becauſe that ſum would then, with proper induſtry, furniſh all the neceſſaries of life, and render the freeholder, if he pleaſed, an independent man: For biſhop Fleetwood, in his *chronicon precioſum*, written at the beginning of the preſent century, has fully proved 40 ſhillings in the reign of Henry VI. to have been equal to 12 pounds *per annum* in the reign of queen Anne; and, as the value of money is very conſiderably lowered ſince the biſhop wrote, we may fairly conclude, from this and other circumſtances, that what was equivalent to 12 pounds in his days, is equivalent to 20 at preſent. The other leſs important qualifications of the electors for counties in England and Wales may be collected from the ſtatutes cited below (A); which direct, 2. That no perſon under 21 years of age ſhall be capable of voting for any member. This extends to all ſorts of members as well for boroughs as counties; as does alſo the next, *viz.* 3. That no perſon convicted of perjury, or ſubornation of perjury, ſhall be capable of voting in any election. 4. That no perſon ſhall vote in right of any freehold, granted to him fraudulently to qualify him to vote. Fraudulent grants are ſuch as contain an agreement to reconvey, or to defeat, the eſtate granted; which agreements are made void, and the eſtate is abſolutely veſted in the perſon to whom it is ſo granted. And, to guard the better againſt ſuch frauds, it is farther provided, 5. That every voter ſhall have been in the actual poſſeſſion, or receipt of the profits, of his freehold to his own uſe for 12 calendar months before; except it came to him by deſcent, marriage, marriage-ſettlement, will, or promotion to a benefice or office. 6. That no perſon ſhall vote in reſpect of an annuity or rent-charge, unleſs regiſtered with the clerk of the peace 12 kalendar months before. 7. That in mortgaged or truſt eſtates, the perſon in poſſeſſion, under the above-mentioned reſtrictions, ſhall have the vote. 7. That only one perſon ſhall be admitted to vote for any one houſe or tenement, to prevent the ſplitting of freeholds. 9. That no eſtate ſhall qualify a voter, unleſs the eſtate has been aſſeſſed to ſome land-tax aid, at leaſt 12 months before the election. 10. That no tenant by copy of court-roll ſhall be permitted to vote as a freeholder. Thus much for the electors in counties.

(A) 7 and 8 Will. III. c. 25. 10 Ann. c. 23. 2 Geo. II. c. 21. 18 Geo. II. c. 18. 31 Geo. II. c. 14. 3 Geo. III. c. 24.

As for the electors of citizens and burgeſſes, theſe are ſuppoſed to be the mercantile part or trading intereſt of this kingdom. But as trade is of a fluctuating nature, and ſeldom long fixed in a place, it was formerly left to the crown to ſummon, *pro re nata*, the moſt flouriſhing towns to ſend repreſentatives to parliament. So that as towns increaſed in trade, and grew populous, they were admitted to a ſhare in the legiſlature. But the misfortune is, that the deſerted boroughs continued to be ſummoned, as well as thoſe to whom their trade and inhabitants were transferred; except a few which petitioned to be eaſed of the expence, then uſual, of maintaining their members: four ſhillings a-day being allowed for a knight of the ſhire, and two ſhillings for a citizen or burgeſs; which was the rate of wages eſtabliſhed in the reign of Edward III. Hence the members for boroughs now bear above a quadruple proportion to thoſe for counties; and the number of parliament men is increaſed ſince Forteſcue's time, in the reign of Henry VI. from 300 to upwards of 500, excluſive of thoſe for Scotland. The univerſities were, in general, not empowered to ſend burgeſſes to parliament; though once, in 28 Edw. I. when a parliament was ſummoned to conſider of the king's right to Scotland, there were iſſued writs, which required the univerſity of Oxford to ſend up four or five, and that of Cambridge two or three, of their moſt diſcreet and learned lawyers for that purpoſe. But it was king James the firſt, who indulged them with the permanent privilege to ſend conſtantly two of their own body; to ſerve for thoſe ſtudents who, though uſeful members of the community, were neither concerned in the landed nor the trading intereſt; and to protect in the legiſlature the rights of the republic of letters. The right of election in boroughs is various, depending entirely on the ſeveral charters, cuſtoms, and conſtitutions of the reſpective places; which has occaſioned infinite diſputes: tho' now, by ſtatute 2 Geo. II. c. 24. the right of voting for the future, ſhall be allowed according to the laſt determination of the houſe of commons concerning it; and, by ſtatute 3 Geo. III. c. 15. no freeman of any city or borough (other than ſuch as claim by birth, marriage, or ſervitude) ſhall be entitled to vote therein, unleſs he hath been admitted to his freedom 12 calendar months before.

(2.) Next, as to the qualifications of perſons to be *elected* members of the houſe of commons. Some of theſe depend upon the law and cuſtom of parliaments, declared by the houſe of commons; others upon certain ſtatutes. And from theſe it appears, 1. That they muſt not be aliens born, or minors. 2. That they muſt not be any of the 12 judges, becauſe they ſit in the lords' houſe; nor of the clergy, for they ſit in the convocation; nor perſons attainted of treaſon or felony, for they are unfit to ſit any where. 3. That ſheriffs of counties, and mayors and bailiffs of boroughs, are not eligible in their reſpective juriſdictions, as being returning officers; but that ſheriffs of one county are eligible to be knights of another. 4. That, in ſtrictneſs, all members ought to have been inhabitants of the places for which they are choſen: but this, having been long diſregarded, was at length entirely repealed by ſtatute 14 Geo. III. c. 58. 5. That no perſons concerned in the management of any duties or taxes created ſince 1692, except the commiſſioners of the treaſury, nor any of the officers following, (*viz.* commiſſioners of prizes, tranſports, ſick and wounded, wine-licences, navy, and victualling; ſecretaries or receivers of prizes; comptrollers of the army-accounts; agents for regiments; governors of plantations, and their deputies; officers of Minorca or Gibraltar; officers of the exciſe and cuſtoms; clerks or deputies in the ſeveral offices of the treaſury, exchequer, navy, victualling, admiralty, pay of the army or navy, ſecretaries of ſtate, ſalt, ſtamps, appeals, wine-licences, hackney-coaches, hawkers, and pedlars) nor any perſons that hold any new office under the crown created ſince 1705, are capable of being elected, or ſitting as members. 6. That no perſon having a penſion under the crown during pleaſure, or for any terms of years, is capable of being elected or ſitting. 7. That if any member accepts an office under the crown, except an officer in the army or navy accepting a new commiſſion, his ſeat is void; but ſuch member is capable of being re-elected. 8. That all knights of the ſhire ſhall be actual knights, or ſuch notable eſquires and gentlemen as have eſtates ſufficient to be knights, and by no means of the degree of yeomen. This is reduced to a ſtill greater certainty, by ordaining, 9. That every knight of a ſhire ſhall have a clear eſtate of freehold or copyhold to the value of 600l. *per annum*, and every citizen and burgeſs to the value of 300l.: except the eldeſt ſons of peers and of perſons qualified to be knights of ſhires, and except the members for the two univerſities: which ſomewhat balances the aſcendant which the boroughs have gained over the counties, by obliging the trading intereſt to make choice of landed men: and of this qualification the member muſt make oath, and give in the particulars in writing, at the time of his taking his ſeat. But, ſubject to theſe ſtanding reſtrictions and diſqualifications, every ſubject of the realm is eligible of common right: though there are inſtances, wherein perſons in particular circumſtances have forfeited that common right, and have been declared ineligible *for that parliament*, by a vote of the houſe of commons; or *for ever*, by an act of the legiſlature. But it was an unconſtitutional prohibition, which was grounded on an ordinance of the houſe of *lords*, and inſerted in the *king's* writs, for the parliament holden at Coventry, 6 Hen. IV. that no apprentice or other man of the law ſhould be elected a knight of the ſhire therein: in return for which, our law-books and hiſtorians have branded this parliament with the name of *parliamentum indoctum*, or the lack-learning parliament; and Sir Edward Coke obſerves with ſome ſpleen, that there was never a good law made thereat.

(3.) The third point, regarding elections, is the method of proceeding therein. This is alſo regulated by the law of parliament, and the ſeveral ſtatutes referred to in the margin below, (B); all which we ſhall blend together, and extract out of them a ſummary account of the method of proceeding to elections.

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As ſoon as the parliament is ſummoned, the lord chancellor (or if a vacancy happens during the ſitting of parliament, the ſpeaker, by order of the houſe, and without ſuch order if a vacancy happens by death in the time of a receſs for upwards of 20 days) ſends his warrant to the clerk of the crown in chancery; who thereupon iſſues out writs to the ſheriff of every county, for the election of all the members to ſerve for that county, and every city and borough therein. Within three days after the receipt of this writ, the ſheriff is to ſend his precept, under his ſeal, to the proper returning officers of the cities and boroughs, commanding them to elect their members: and the ſaid returning officers are to proceed to election within eight days from the receipt of the precept, giving four days notice of the ſame; and to return the perſons choſen, together with the precept, to the ſheriff.

But elections of knights of the ſhire muſt be proceeded to by the ſheriffs themſelves in perſon, at the next county-court that ſhall happen after the delivery of the writ. The county-court is a court held every month or oftener by the ſheriff, intended to try little cauſes not exceeding the value of 40s. in what part of the county he pleaſes to appoint for that purpoſe: but for the election of knights of the ſhire, it muſt be held at the moſt uſual place. If the county-court falls upon the day of delivering the writ, or within ſix days after, the ſheriff may adjourn the court and election to ſome other convenient time, not longer than 16 days, nor ſhorter than 10; but he cannot alter the place, without the conſent of all the candidates: and, in all ſuch caſes, 10 days public notice muſt be given of the time and place of the election.

And, as it is eſſential to the very being of parliament that elections ſhould be abſolutely free, therefore all undue influences upon the electors are illegal, and ſtrongly prohibited. For Mr Locke ranks it among thoſe breaches of truſt in the executive magiſtrate, which, according to his notions, amount to a diſſolution of the government, "if he employs the force, treaſure, and offices of the ſociety to corrupt the repreſentatives, or openly to pre-engage the electors, and preſcribe what manner of perſons ſhall be choſen: For thus to regulate candidates and electors, and new-model the ways of election, what is it, (ſays he,) but to cut up the government by the roots, and poiſon the very fountain of public ſecurity?" As ſoon, therefore, as the time and place of election, either in counties or boroughs, are fixed, all ſoldiers quartered in the place are to remove, at leaſt one day before the election, to the diſtance of two miles or more; and not to return till one day after the poll is ended. Riots likewiſe have been frequently determined to make an election void. By vote alſo of the houſe of commons, to whom alone belongs the power of determining conteſted elections, no lord of parliament, or lord lieutenant of a county, hath any right to interfere in the election of commoners; and, by ſtatute, the lord warden of the cinque ports ſhall not recommend any members there. If any officer of the exciſe, cuſtoms, ſtamps, or certain other branches of the revenue, preſumes to intermeddle in elections, by perſuading any voter or diſſuading him, he forfeits 100l. and is diſabled to hold any office.

Thus are the electors of one branch of the legiſlature ſecured from any undue influence from either of the other two, and from all external violence and compulſion. But the greateſt danger is that in which themſelves co-operate, by the infamous practice of bribery and corruption. To prevent which, it is enacted, that no candidate ſhall, after the date (uſually called the *teſte*) of the writs, or after the vacancy, give any money or entertainment to his electors, or promiſe to give any, either to particular perſons, or to the place in general, in order to his being elected: on pain of being incapable to ſerve for that place in parliament. And if any money, gift, office, employment, or reward be given, or promiſed to be given, to any voter, at any time, in order to influence him to give or with-hold his vote, as well he that takes as he that offers ſuch bribe forfeits 500l. and is for ever diſabled from voting and holding any office in any corporation; unleſs, before conviction, he will diſcover ſome other offender of the ſame kind, and then he is indemnified for his own offence. The firſt inſtance that occurs, of election bribery, was ſo early as 13 Eliz. when one Thomas Longe (being a ſimple man, and of ſmall capacity to ſerve in parliament) acknowledged that he had given the returning officer and others of the borough for which he was choſen, four pounds to be returned member, and was for that premium elected. But for this offence the borough was amerced, the member was removed, and the officer fined and impriſoned. But, as this practice hath ſince taken much deeper and more univerſal root, it hath occaſioned the making of theſe wholeſome ſtatutes; to complete the efficacy of which, there is nothing wanting but reſolution and integrity to put them in ſtrict execution.

Undue influence being thus guarded againſt, the election is to be proceeded to on the day appointed; the ſheriff or other returning officer firſt taking an oath againſt bribery, and for the due execution of his office. The candidates likewiſe, if required, muſt ſwear to their qualification, and the electors in counties to theirs; and the electors both in counties and boroughs are alſo compellable to take the oath of abjuration, and that againſt bribery and corruption. And it might not be amiſs, if the members elected were bound to take the latter oath, as well as the former; which, in all probability, would be much more effectual, than adminiſtring it only to the electors.

The election being cloſed, the returning officer in boroughs returns his precept to the ſheriff, with the perſons elected by the majority: and the ſheriff returns the whole, together with the writ for the county and the knights elected thereupon, to the clerk of the crown in chancery; before the day of meeting, if it be a new parliament, or within 14 days after the election, if it be an occaſional vacancy; and this under penalty of 500l. If the ſheriff does not return ſuch knights only as are duly elected, he forfeits, by the old ſtatutes of Henry VI. 100l.; and the returning officer in boroughs for a like falſe return, 40l.; and they are beſides liable to an action, in which double damages ſhall be recovered, by the later ſtatutes of king William: and any perſon bribing the returning officer ſhall alſo forfeit 300l. But the members returned by him are the ſitting members, until the houſe of commons, upon petition, ſhall adjudge the return to be falſe and illegal. The form and manner of proceeding upon ſuch

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(3.) The third point, regarding elections, is the method of proceeding therein. This is alſo regulated by the law of parliament, and the ſeveral ſtatutes referred to in the margin below, (B); all which we ſhall blend together, and extract out of them a ſummary account of the method of proceeding to elections.

(B) 7 Hen. IV. c. 15. 8 Hen. VI. c. 7. 23 Hen. VI. c. 14. 1 W. & M. ſt. 1. c. 2. 2 W. & M. ſt. 1. c 7. 5 & 6 W. & M. c. 20. 7 W. III. c. 4. 7 & 8 W. III. c. 7. and c. 25. 10 & 11 W. III. c. 7. 12 & 13 W. III. c. 10. 6 Ann. c. 23. 9 Ann. c. 5. 10 Ann. c. 19. and c. 33. 2 Geo. II. c. 24. 8 Geo. II. c. 30. 18 Geo. II. c. 18. 19 Geo. II. c. 28. 10 Geo. III. c. 16. 11 Geo. III. c. 42. 14 Geo. III. c. 15.

As ſoon as the parliament is ſummoned, the lord chancellor (or if a vacancy happens during the ſitting of parliament, the ſpeaker, by order of the houſe, and without ſuch order if a vacancy happens by death in the time of a receſs for upwards of 20 days) ſends his warrant to the clerk of the crown in chancery; who thereupon iſſues out writs to the ſheriff of every county, for the election of all the members to ſerve for that county, and every city and borough therein. Within three days after the receipt of this writ, the ſheriff is to ſend his precept, under his ſeal, to the proper returning officers of the cities and boroughs, commanding them to elect their members: and the ſaid returning officers are to proceed to election within eight days from the receipt of the precept, giving four days notice of the ſame; and to return the perſons choſen, together with the precept, to the ſheriff.

But elections of knights of the ſhire muſt be proceeded to by the ſheriffs themſelves in perſon, at the next county-court that ſhall happen after the delivery of the writ. The county-court is a court held every month or oftener by the ſheriff, intended to try little cauſes not exceeding the value of 40s. in what part of the county he pleaſes to appoint for that purpoſe: but for the election of knights of the ſhire, it muſt be held at the moſt uſual place. If the county-court falls upon the day of delivering the writ, or within ſix days after, the ſheriff may adjourn the court and election to ſome other convenient time, not longer than 16 days, nor ſhorter than 10; but he cannot alter the place, without the conſent of all the candidates: and, in all ſuch caſes, 10 days public notice muſt be given of the time and place of the election.

And, as it is eſſential to the very being of parliament that elections ſhould be abſolutely free, therefore all undue influences upon the electors are illegal, and ſtrongly prohibited. For Mr Locke ranks it among thoſe breaches of truſt in the executive magiſtrate, which, according to his notions, amount to a diſſolution of the government, "if he employs the force, treaſure, and offices of the ſociety to corrupt the repreſentatives, or openly to pre-engage the electors, and preſcribe what manner of perſons ſhall be choſen: For thus to regulate candidates and electors, and new-model the ways of election, what is it, (ſays he,) but to cut up the government by the roots, and poiſon the very fountain of public ſecurity?" As ſoon, therefore, as the time and place of election, either in counties or boroughs, are fixed, all ſoldiers quartered in the place are to remove, at leaſt one day before the election, to the diſtance of two miles or more; and not to return till one day after the poll is ended. Riots likewiſe have been frequently determined to make an election void. By vote alſo of the houſe of commons, to whom alone belongs the power of determining conteſted elections, no lord of parliament, or lord lieutenant of a county, hath any right to interfere in the election of commoners; and, by ſtatute, the lord warden of the cinque ports ſhall not recommend any members there. If any officer of the exciſe, cuſtoms, ſtamps, or certain other branches of the revenue, preſumes to intermeddle in elections, by perſuading any voter or diſſuading him, he forfeits 100l. and is diſabled to hold any office.

Thus are the electors of one branch of the legiſlature ſecured from any undue influence from either of the other two, and from all external violence and compulſion. But the greateſt danger is that in which themſelves co-operate, by the infamous practice of bribery and corruption. To prevent which, it is enacted, that no candidate ſhall, after the date (uſually called the *teſte)* of the writs, or after the vacancy, give any money or entertainment to his electors, or promiſe to give any, either to particular perſons, or to the place in general, in order to his being elected: on pain of being incapable to ſerve for that place in parliament. And if any money, gift, office, employment, or reward be given, or promiſed to be given, to any voter, at any time, in order to influence him to give or with-hold his vote, as well he that takes as he that offers ſuch bribe forfeits 500l. and is for ever diſabled from voting and holding any office in any corporation; unleſs, before conviction, he will diſcover ſome other offender of the ſame kind, and then he is indemnified for his own offence. The firſt inſtance that occurs, of election bribery, was ſo early as 13 Eliz. when one Thomas Longe (being a ſimple man, and of ſmall capacity to ſerve in parliament) acknowledged that he had given the returning officer and others of the borough for which he was choſen, four pounds to be returned member, and was for that premium elected. But for this offence the borough was amerced, the member was removed, and the officer fined and impriſoned. But, as this practice hath ſince taken much deeper and more univerſal root, it hath occaſioned the making of theſe wholeſome ſtatutes; to complete the efficacy of which, there is nothing wanting but reſolution and integrity to put them in ſtrict execution.

Undue influence being thus guarded againſt, the election is to be proceeded to on the day appointed; the ſheriff or other returning officer firſt taking an oath againſt bribery, and for the due execution of his office. The candidates likewiſe, if required, muſt ſwear to their qualification, and the electors in counties to theirs; and the electors both in counties and boroughs are alſo compellable to take the oath of abjuration, and that againſt bribery and corruption. And it might not be amiſs, if the members elected were bound to take the latter oath, as well as the former; which, in all probability, would be much more effectual, than adminiſtring it only to the electors.

The election being cloſed, the returning officer in boroughs returns his precept to the ſheriff, with the perſons elected by the majority: and the ſheriff returns the whole, together with the writ for the county and the knights elected thereupon, to the clerk of the crown in chancery; before the day of meeting, if it be a new parliament, or within 14 days after the election, if it be an occaſional vacancy; and this under penalty of 500l. If the ſheriff does not return ſuch knights only as are duly elected, he forfeits, by the old ſtatutes of Henry VI. 100l.; and the returning officer in boroughs for a like falſe return, 40l.; and they are beſides liable to an action, in which double damages ſhall be recovered, by the later ſtatutes of king William: and any perſon bribing the returning officer ſhall alſo forfeit 300l. But the members returned by him are the ſitting members, until the houſe of commons, upon petition, ſhall adjudge the return to be falſe and illegal. The form and manner of proceeding upon ſuch petition are now regulated by ſtatute 10 Geo. III. c. 16. (amended by 11 Geo. III. c. 42. and made perpetual by 14 Geo. III. c. 15.) which directs the method of chuſing by lot a ſelect committee of 15 members, who are ſworn well and truly to try the ſame, and a true judgment to give, according to the evidence.

Election *of Scots Peers*. See Lords.

ELECTOR, a perſon who has a right to elect or chuſe another to an office, honour, &c. See Election.

Elector is particularly, and by way of eminence, applied to thoſe princes of Germany in whom lies the right of electing the emperor: being all ſovereign princes, and the principal members of the empire.

The electoral college, conſiſting of all the electors of the empire, is the moſt illuſtrious and auguſt body in Europe. Bellarmine and Baronius attribute the inſtitution of it to pope Gregory V. and the emperor Otho III. in the tenth century; of which opinion are the generality of hiſtorians, and particularly the canoniſts: however, the number of electors was unſettled, at leaſt, till the 13th century. In 1356 Charles IV. by the golden bull, fixed the number of electors to ſeven; three eccleſiaſtics, *viz.* the archbiſhops of Mentz, Treves, and Cologne; and four ſeculars, viz. the king of Bohemia, count Palatine of the Rhine, duke of Saxony, and marquis of Brandenburg. In 1648 this order was changed, the duke of Bavaria being put in the place of the count Palatine, who having accepted the crown of Bohemia was outlawed by the emperor; but being at length reſtored, an eighth electorate was erected for the duke of Bavaria. In 1692, a ninth electorate was created, by the emperor Leopold, in favour of the duke of Hanover, of the houſe of Brunſwic Lunenburg.

There is this difference between the ſecular and eccleſiaſtical electors, that the firſt have an active and paſſive voice, that is, may chuſe and be choſen; the laſt, an active only. The three archbiſhops are to be 30 years old, before they can be advanced to the dignity; the ſeculars, 18, before they can perform the office themſelves. Theſe laſt have each their vicars, who officiate in their abſence.

Beſides the power of chooſing an emperor, the electors have alſo that of capitulating with and depoſing him; ſo that, if there be one ſuffrage wanting, a proteſt may be entered againſt the proceedings. By the right of capitulation, they attribute to themſelves great privileges, as making of war, coining, and taking care of the public intereſt and ſecurity of the ſtates; and the emperor promiſes, upon oath, to receive the empire upon theſe conditions.

The electors have precedence of all other princes of the empire, even of cardinals and kings; and are addreſſed under the title of *electoral highneſs*.

Their ſeveral functions are as follow. The elector of Mentz is chancellor of Germany, convokes the ſtates, and gives his vote before any of the reſt. The elector of Cologne is grand chancellor of Italy, and conſecrates the emperor. The elector of Treves is chancellor of the Gauls, and confers impoſition of hands upon the emperor. The count Palatine of the Rhine is great treaſurer of the empire, and preſents the emperor with a globe at his coronation. The elector of Bavaria is great maſter of the imperial palace, and carries the golden apple. The marquis of Brandenburg is grand chamberlain, and puts the ring on the emperor's finger. The elector of Saxony is grand marſhal, and gives the ſword to the emperor. The king of Bohemia is grand butler, and puts Charlemagne's crown on the emperor's head. Laſtly, the elector of Hanover, now king of Great Britain, is arch-treaſurer, though firſt erected under the title of *ſtandard-bearer* of the empire.

ELECTORATE, a term uſed as well to ſignify the dignity of, as the territories belonging to, any of the electors of Germany; ſuch are Bavaria, Saxony, &c. See Elector.

ELECTRIC fluid. See Electricity.

ELECTRICITY,

In general, ſignifies the operations of a very ſubtile fluid, in moſt caſes inviſible, but which ſometimes becomes the object of our ſight and other ſenſes, diſcovering itſelf to be one of the chief agents employed in producing the phenomena of nature.

Sect. I. *Hiſtory of Electricity.*

1 Electricity when firſt mentioned.

Tho' it is certain that, ever ſince the creation of the world, the fluid we ſpeak of hath had the ſame ſhare in all the natural operations that it hath juſt now; yet the diſcovery of its action, and even of its exiſtence, is, comparatively ſpeaking, of a very late date. Thales the Mileſian, who lived about 600 years before Chriſt, was the firſt that obſerved the electrical properties of amber. Of theſe indeed, he knew no more than that this ſubſtance would attract light bodies when it was rubbed. For 300 years after his time, we hear nothing farther concerning this ſubject. Theophraſtus then tells us, that the *lyncurium* (the ſame ſubſtance now called the *tourmalin*), has the property of attracting light bodies, as well as amber. From this time, there is a chaſm in the hiſtory of electricity for no leſs than 1900 years. Indeed, it is ſcarce to be ſuppoſed that during this long interval any perſon applied himſelf to the inveſtigation of the ſubject; as, for the greateſt part of it, ſcience of every kind was almoſt totally extinguiſhed. The electrical properties of *jet*, however, and, according to Mr Boſe, of the *agate*, were ſome way or other diſcovered during the abovementioned period. But it was not till the beginning of the 17th century, that the ſubject of electricity became properly a diſtinct ſcience, and the foundation was laid of thoſe diſcoveries which have ſince taken place.

2 Diſcoveries of Doctor Gilbert.

The firſt who can properly be called an *electrician*, was Dr William Gilbert, who, in the year 1600, wrote a book *de Magnete*, which contains a variety of electrical experiments. All theſe, however, conſidered only the attractive property of certain ſubſtances, which, from their agreement in this reſpect with amber (in Latin *electrum*, were called *electric*. Dr Gilbert's merit conſiſts in his having been at great pains to find out a number of ſuch ſubſtances, and thus conſiderably enlarging the number of electrics.

Till the year 1670, it doth not appear that any farther diſcoveries were made; except ſome trifling additions to the catalogue of electrics. About this time. Mr Boyle applied himſelf to the ſtudy of electricity, He enlarged the catalogue of electrics; and found that their electric properties were increaſed by wiping and warming them before they were rubbed. He obſerved alſo, that all kinds of bodies were attracted promiſcuouſly; and imagined that they were attracted *in vacuo* as well as in air. This laſt poſition, however, is denied by Mr Beccaria; and we ſhall afterwards ſhow that Mr Boyle muſt neceſſarily have been miſtaken. He alſo obſerved the electric light, though only in the inſtance of ſome diamonds.

3 Diſcoveries of Otto Guericke and Sir Iſaac Newton.

Otto Guericke, however, who was cotemporary with Mr Boyle, improved the ſcience much farther. He made uſe of a ſulphur globe, whirled on an axis much in the ſame way with our preſent glaſs globes. Thus he could excite a vaſtly greater power of electricity than any of his predeceſſors, and try all their experiments to much more advantage. He diſcovered electric repulſion; and not only ſaw the electric light more clearly than Mr Boyle, but heard the hiſſing ſound with which it is emitted. He alſo made another remarkable diſcovery, but which has ſince been very generally overlooked; namely, that a feather, when repelled by an excited electric, always keeps the ſame face towards the body which repells it, as the moon does to the earth. See ASTRONOMY, n° 101.

The next diſcovery of any moment was made by Sir Iſaac Newton; who obſerved, that the electric attraction and repulſion penetrated through glaſs; and it is much to be regretted that this accurate philoſopher did not apply himſelf to the ſtudy of electricity with greater aſſiduity.

4 Remarkable diſcovery by Mr Haukſbee.

In 1709, a treatiſe was written on electricity by Mr Haukſbee; who not only far excelled all his predeceſſors and cotemporaries, but alſo made ſome diſcoveries which well deſerve the attention of the moſt expert electricians at this day. Beſides a variety of new experiments made upon electric attraction and repulſion, as well as the light emitted by electric bodies; he found a method of rendering opaque bodies tranſparent by means of electricity. He lined more than half the inſide of a glaſs globe with ſealing wax; and having exhauſted the globe, he put it in motion; when applying his hand to excite it, he ſaw the ſhape and figure of all the parts of his hand diſtinctly and perfectly, on the concave ſuperficies of the wax within, juſt as if only pure glaſs without any wax at all had been interpoſed between his eye and his hand. The lining of wax, where it was ſpread the thinneſt, would but juſt allow the ſight of a candle through it in the dark; but in ſome places the wax was at leaſt an eighth part of an inch thick. Yet, even in theſe places, the light and figure of his hand were as diſtinguiſhable through it as any where elſe. The ſealing-wax did not adhere to the glaſs in all places; but this made no difference with regard to the tranſparency. Pitch anſwered the purpoſe equally well with ſealing-wax.

Mr Haukſbee alſo made a farther improvement, by uſing a glaſs globe, which acts much more powerfully than a ſulphur one. After his death, however, not only the uſe of glaſs globes, but even the ſtudy of electricity itſelf, ſeems to have been pretty generally laid aſide for ſome time. The reaſon of this was, that the recent diſcoveries of Sir Iſaac Newton engroſſed the attention of philoſophers to ſuch a degree, that they had no leiſure for any thing elſe. After the death of that great man, however, the ſcience of electricity began to revive; and, in 1729, a capital diſcovery was made by Mr Stephen Grey. This was the diſtinction between conductors and non-conductors of electricity. As the diſcovery was entirely accidental, and attended with ſeveral curious circumſtances, we ſhall here give ſome account of it. In the month of February 1729, Mr Grey, after ſome fruitleſs attempts to excite an electric power in metals, recollected a ſuſpicion he had for ſome time entertained, that as a glaſs tube, when excited in the dark, communicated its light to various bodies, it might at the ſame time poſſibly communicate to them an electricity; that is, a power of attracting light bodies; which, as yet, was all that was underſtood by the word *electricity*. For this purpoſe he provided himſelf with a glaſs tube, three feet five inches long, and near one inch and two-tenths in diameter. To each end was fitted a cork; to keep the duſt out when the tube was not in uſe. His firſt experiments were made with a view to determine whether the tube would attract equally well with the ends ſhut, as with them open. In this reſpect there was no difference; but he found that the corks attracted and repelled light ſubſtances as well, and rather better than the tube itſelf. He then fixed an ivory ball upon a ſtalk of fir about four inches long; and thruſting the end of the ſtalk into one of the corks, he found the ball endowed with a ſtrong attractive and repulſive virtue. This experiment he repeated in many different ways; fixing the ball upon long ſticks, and upon pieces of braſs and iron wire, always with the ſame ſucceſs; but he conſtantly obſerved, that the ball at the end attracted more vigorouſly, than that part of the wire neareſt the tube.

5 Difference between electrics and conductors diſcovered by Mr Grey.

The inconvenience of uſing long wires in this manner, put Mr Grey upon trying whether the ball might be ſuſpended by a pack-thread with a loop on the tube, with equal ſucceſs; and the event fully anſwered his expectation. Having thus ſuſpended bodies of the greateſt length he conveniently could, to his tube, he aſcended a balcony 26 feet high, and faſtening a ſtring to his tube, found that the ball would attract light bodies on the ground below. This experiment ſucceeded in the greateſt heights to which he could aſcend; after which, he attempted to carry the electricity horizontally. His firſt attempt miſcarried, becauſe he ſuſpended his line, which was intended to carry the electricity horizontally, by a pack-thread; and thus the fluid got off from it: but though Mr Grey knew this was the caſe, he could not at that time think of any method to prevent it.

On the 30th of June 1729, Mr Grey paid a viſit to Mr Wheeler, in order to give him a ſpecimen of his experiments; but told him of the unſucceſsful attempt he had made to carry the electric fluid horizontally. Mr Wheeler propoſed to ſuſpend the conducting line by *ſilk*, inſtead of *pack-thread*. For this advice he could give no reaſon, but that the ſilk thread was *ſmaller* than the other: however, with it they ſucceeded perfectly well. Their firſt experiment was in a matted gallery at Mr Wheeler's houſe, on the 2d of July 1729. About four feet from the end of the gallery they faſtened a line acroſs the place. The middle of this line was ſilk, the reſt pack-thread. Over the ſilken part they laid one end of the conducting line, to which was faſtened the ivory ball, and which hung down about nine feet below the line ſtretched acroſs the gallery. The conducting line was 80½ feet in length, and the other end of it was faſtened by a loop to the electric tube. Upon rubbing the tube, the ivory ball attracted and repelled light ſubſtances as the tube itſelf would have done. They next contrived to return the line, ſo that the whole length of it amounted to 147 feet; which alſo anſwered pretty well. But, ſuſpecting that the attraction would be ſtronger without doubling or returning the line, they made uſe of one carried ſtraight forward for 124 feet; and, as they expected, found the attraction in this manner ſtronger than when the line had been doubled. Thus they proceeded with till their experiments; ſtill adding more conducting line, at laſt their ſilk-ſtring broke with the weight. This they endeavoured to ſupply, firſt with a ſmall iron-wire, and then with a braſs one. The reſult of theſe experiments, however, ſoon convinced them that the ſilk refuſed to conduct the electric fluid, not on account of its *ſmallneſs*, as they had ſuppoſed, but on account of ſome difference in the matter. The wires were ſmaller than the ſilk-thread, yet the electricity was effectually carried off by them. They had recourſe, therefore, to thicker lines of ſilk; and, thus conveyed the electric matter to the diſtance of 765 feet; nor did they perceive the virtue to be at all diminiſhed by the diſtance to which it was carried.

6
He diſcovers a perpetual attractive power in electrics.

This diſcovery of the non-conducting power of ſilk, was quickly followed by a diſcovery of the ſame power in many other ſubſtances: and thus in fact, the foundation of almoſt all the ſubſequent improvements in electricity was laid; tho' in this ſcience, as well as in moſt others, few diſcoveries have been made by reaſoning, but many by accident. Mr Grey continued to ſtudy electricity as long as he lived; and has given a ſet of experiments, of which Dr Prieſtley ſays, "It is not eaſy to know what to make of them." He imagined that he had diſcovered in all electric ſubſtances a *perpetual attractive power*, which required no kind of excitation either by heating, rubbing, or any kind of attrition. He took 19 different ſubſtances, which were either roſin, gum-lac, ſhell-lac, bees-wax, ſulphur, pitch, or two or three of theſe differently compounded. Theſe he melted in a ſpherical iron ladle; except the ſulphur, which was beſt done in a glaſs veſſel. When theſe were taken out of the ladle, and their ſpherical ſurfaces hardened, he ſays they would not attract till the heat was abated, or till they came to a certain degree of warmth; that there was then a ſmall attraction, which increaſed till the ſubſtance was cold, when it was very conſiderable. The manner in which he kept theſe ſubſtances in a ſtate of attraction was, by wrapping them in any thing which would preſerve them from the external air. At firſt, for the ſmaller bodies he uſed white paper, and for the larger ones white flannel; but afterwards, he found that black worſted ſtockings would do as well. When thus wrapped up, they were put into a large firm box, where they remained till he had occaſion to uſe them. Thus prepared, they retained their attractive virtue for four months. Theſe experiments are ſimilar to ſome others lately made and publiſhed as new diſcoveries.

7
Imagines he can imitate the planetary motions.

Some other experiments were made by Mr Grey, with regard to the attraction of electric bodies *in vacuo*; and in this he determined with Mr Boyle againſt the opinion of Mr Beccaria abovementioned. But the moſt remarkable experiments mentioned by Mr Grey, are his imitations of the planetary motions. "I have lately made, (ſays he), ſeveral new experiments upon the projectile and pendulous motions of ſmall bodies by electricity; by which ſmall bodies may be made to move about large ones, either in circles or ellipſes; and thoſe either concentric or eccentric to the centre of the large body about which they move, ſo as to make many revolutions about them. And this motion will conſtantly be the ſame way that the planets move about the ſun, *viz.* from the right hand to the left, or from weſt to eaſt. But theſe little planets, if I may ſo call them, move much faſter in their apogeon than in the perigeon parts of their orbits; which is directly contrary to the motion of the planets about the ſun." The manner in which theſe experiments were made, as delivered by him on his death-bed to Dr Mortimer, was as follows: "Place a ſmall iron globe, (ſaid he), of an inch or an inch and an half in diameter, on the middle of a circular cake of roſin, ſeven or eight inches in diameter, gently excited; and then a light body ſuſpended by a very fine thread, five or ſix inches long, held in the hand over the centre of the cake, will, of itſelf, begin to move in a circle round the iron globe, and conſtantly from weſt to eaſt. If the globe is placed at any diſtance from the centre of the circular cake, it will deſcribe an ellipſe, which will have the ſame excentricity as the diſtance of the globe from the centre of the cake. If the cake of roſin be of an elliptical form, and the iron globe be placed in the centre of it, the light body will deſcribe an elliptical orbit of the ſame excentricity with the form of the cake. If the globe be placed in or near one of the foci of the elliptical cake, the light body will move much ſwifter in the apogee than in the perigee of its orbit. If the iron globe is fixed on a pedeſtal an inch from the table, and a glaſs hoop, or a portion of a hollow glaſs cylinder excited, be placed round it, the light body will move as in the circumſtances mentioned above, and with the ſame varieties." He ſaid, moreover, that the light body would make the ſame revolutions, only ſmaller, round the iron globe placed on the bare table, without any electrical body to ſupport it: but he acknowledged that he had not found the experiment ſucceed if the thread was ſupported by any thing but a human hand, though he imagined any other animal ſubſtance would have anſwered the purpoſe.

Theſe experiments occaſioned a great deal of ſpeculation. Dr Mortimer was the only perſon who was able to repeat them with ſucceſs, and he only when nobody but himſelf was preſent. It was therefore generally ſuppoſed that both he and Mr Grey had been deceived: but from ſome experiments to be related hereafter, it ſeems probable that the ſucceſs of Mr Grey and Dr Mortimer was owing to their having performed their experiments with candle-light; and the failure of the others, to their having attempted them by day-light. Notwithſtanding which, it is more than probable that Mr Grey has been deceived in a number of particulars; for no motion can be performed by an artificial excitation of the electric fluid, but what is attended with much irregularity.

8 Vitreous and reſinous electricity diſcovered by Mr Du Fay.

Soon after Mr Grey's diſcovery of the difference between conductors and non-conductors of electricity, Mr Du Fay diſcovered the difference between poſitive and negative, or, as they were for ſome time called, the *vitreous* and *reſinous* electricities. This diſcovery was quite accidental. It was made in conſequence of his caſually obſerving, that a piece of leaf-gold repelled by an excited glaſs tube, and which he meant to chaſe about the room with a piece of excited gum copal, inſtead of being repelled by it as it was by the glaſs tube, it was eagerly attracted. The ſame was the caſe with ſealing-wax, ſulphur, roſin, and a number of other ſubſtances. He diſcovered alſo, that it was impoſſible to excite a tube in which the air was condenſed.

In the year 1742, the uſe of glaſs globes was again introduced by Mr Boſe, profeſſor of philoſophy at Wittemburgh; though ſome attribute this to Chriſtian Auguſtus Hanſen, profeſſor of mathematics at Leipſic. He added alſo a prime conductor, which conſiſted of a tube of iron or tin. It was at firſt ſupported by a man ſtanding upon cakes of roſin; but afterwards ſuſpended by ſilk lines horizontally before the globe. A bundle of thread was put into the end next to the globe, which not only prevented any injury to the glaſs, but rendered the electricity ſtronger.

9 Electrical ſhock diſcovered.

The moſt remarkable diſcovery that hath yet been made in the ſcience of electricity, was in the end of the year 1745, and beginning of 1746. This was the method of giving the electric ſhock, or the accumulation of the power of electricity in a vial. This had its name of the *Leyden vial*, from Mr Cunæus, a native of Leyden, who exhibited it as he was repeating ſome experiments made by Meſſrs Muſchenbroek and Allamand, profeſſors in the univerſity of that city. He was not, however, the inventor. The merit of this diſcovery (if any merit can ariſe from a diſcovery made by accident) belongs to Mr Van Kleiſt, dean of the cathedral at Camin. On the 4th of November 1745, he ſent the following account of it to Dr Lieberkuhn at Berlin: "When a nail, or a piece of thick braſs wire, &c. is put into a ſmall apothecary's vial, and electrified, remarkable effects follow: but the vial muſt be very dry, or warm. I commonly rub it over beforehand with a finger, on which I put ſome pounded chalk. If a little mercury or a few drops of ſpirit of wine are put into it, the experiment ſucceeds the better. As ſoon as this phial and nail are removed from the electrifying glaſs, or the prime conductor to which it hath been expoſed is taken away, it throws out a pencil of flame ſo long, that with this burning machine in my hand, I have taken above 60 ſteps in walking about my room. When it is electrified ſtrongly, I can take it into another room, and there fire ſpirits of wine with it. If, while it is electrifying, I put my finger, or a piece of gold which I hold in my hand, to the nail, I receive a ſhock which ſtuns my arms and ſhoulders.

"A tin tube, or a man placed upon electrics, is electrified much ſtronger by this means than in the common way. When I preſent this vial and nail to a tin tube, which I have, 15 feet long, nothing but experience can make a perſon believe how ſtrongly it is electrified. Two thin glaſſes have been broken by the ſhock of it."

Soon after this, a method of giving the ſhock was diſcovered in Holland by Mr Cunæus, in the following manner. M. Muſchenbroek and his friends, obſerving that electrified bodies expoſed to the common atmoſphere, which is always replete with conducting particles of various kinds, ſoon loſt their electricity, and were capable of retaining but a ſmall quantity of it; imagined, that, were the electrified bodies terminated on all ſides by original electrics, they might be capable of receiving a ſtronger power, and retaining it for a longer time. Glaſs being the moſt convenient electric for this purpoſe, and water the moſt convenient non-electric, they firſt made theſe experiments with water in glaſs bottles: but no conſiderable diſcovery was made, till Mr Cunæus, happening to hold his glaſs veſſel in one hand, and endeavouring to diſengage it from the conductor with the other, (when he imagined the water had received as much electricity as the machine could give it), was ſurpriſed with a ſudden ſhock in his arms and breaſt, which he had not in the leaſt expected.

10 Behaviour of different philoſophers on this occaſion.

The diſcovery of ſuch a terrible effect of the electric power, immediately raiſed the attention of all the philoſophers in Europe. Many of them greatly exaggerated their accounts; either from a natural timidity, or their love of the marvellous. Mr Muſchenbroek, who tried the experiment with a very thin glaſs bowl, told Mr Reamur in a letter wrote ſoon after the expement, That he felt himſelf ſtruck in his arms, ſhoulder, and breaſt, ſo that he loſt his breath; and was two days before he recovered from the effects of the blow and the terror. He added, that he would not take a ſecond ſhock for the whole kingdom of France. Mr Allamand, who made the experiment with a common beer-glaſs, ſaid, that he loſt his breath for ſome moments; and then felt ſuch an intenſe pain all along his right arm, that he was apprehenſive of bad conſequences, but it ſoon after went off without any inconvenience, &c. Other philoſophers, on the contrary, ſhewed their heroiſm and magnanimity, by receiving a number of electric ſhocks as ſtrong as they could poſſibly make them. Mr Boſe abovementioned, wiſhed that he might die by the electric ſhock, in order to furniſh, by his death, an article for the memoirs of the academy of ſciences at Paris. "But, (adds Dr Prieſtley, from whom this account is taken), *it is not given* to every electrician to die in ſo glorious a manner as the juſtly envied Richman."

11 Incredible powers attributed to electricity.

From the time of this diſcovery, electricity became the general ſubject of converſation. A great number of people all over Europe, got their livelihood by going about and ſhewing the phenomena of it; and, at the ſame time, the paſſion for the marvellous ſtrongly diſcovered itſelf in ſome effects of electricity, pretended to be found out in Italy and Germany. It was aſſerted by Signior Pivati at Venice, and after him by Verati at Bologna, Mr Bianchi at Turin, and Mr Winckler at Leipſic, that if odoriferous ſubſtances were confined in glaſs veſſels, and the veſſels excited, the odours and other medicinal virtues would tranſpire through the glaſs, infect the atmoſphere of the conductor, and communicate the virtue to all perſons in contact with it; alſo, that thoſe ſubſtances, held in the hands of perſons electrified, would communicate their virtues to them; ſo that the medicines might be made to operate without being taken into the ſtomach. They even pretended to have wrought many cures by the help of electricity applied in this way. To ſee the wonderful effects of theſe *medicated tubes*, as they were called, Mr Nollet travelled into Italy, where he viſited all the gentlemen who had publiſhed any account of theſe experiments. But tho' he engaged them to repeat their experiments in his preſence, and upon himſelf; and though he made it his buſineſs to get all the information he could concerning them; he returned fully convinced, that in no inſtance had odours been found to tranſpire through the pores of excited glaſs, and that no drugs had ever communicated their virtues to people who had only held them in their hands while they were electrified. He was convinced, however, that, by continued electrification without drugs, ſeveral perſons had found conſiderable relief in various diſorders; particularly, that a paralytic perſon had been cured at Geneva, and that one who was deaf of an ear, another who had a violent pain in his head, and a woman with a diſorder in her eyes, had been cured at Bologna; ſo that from this time we may date the introduction of electricity into the medicinal art. See (the *Index* ſubjoined to) MEDICINE.

Another wonderful experiment was the *beatification* of Mr Boze; which other electricians, for a long time, endeavoured to repeat after him, but to no purpoſe. His deſcription of this remarkable experiment was, that if, in electrifying, large globes were employed, and the electrified perſon ſtood upon large cakes of pitch, a lambent flame would by degrees ariſe from the pitch, and ſpread itſelf around his feet; that from thence it would be propagated to his knees and body, till at laſt it aſcended to his head; that then, by continuing the electrification, the perſon's head would be ſurrounded by a glory ſuch as is in ſome meaſure repreſented by painters in their ornamenting the heads of ſaints. Dr Watſon took the utmoſt pains to repeat this experiment. He underwent the operation ſeveral times, and was ſupported during the time of it by ſolid electrics three feet high. Being electrified very ſtrongly, he felt a kind of tingling on the ſkin of his head and in many other parts of his body. The ſenſation reſembled what would ariſe from a vaſt number of inſects crawling over him at the ſame time. He conſtantly obſerved the ſenſation to be the greateſt in thoſe parts of his body which were neareſt to any non-electric; but no light appeared upon his head, tho' the experiment was ſeveral times made in the dark, and with ſome continuance. At laſt the doctor wrote to Mr Boze himſelf, and his anſwer ſhewed that the whole had been a trick. Mr Boze acknowledged that he had made uſe of a ſuit of armour, which was decked with many bullions of ſteel, ſome pointed like nails, others like wedges, and ſome pyramidal; and that when the electriſation was very vigorous, the edges of the helmet would dart forth rays ſomething like thoſe which are painted on the heads of ſaints.

12
Identity of electric fluid with lightning ſuſpected by Dr Franklin.

The identity of the electrical matter with lightning is a diſcovery that hath been of more practical uſe to mankind than any other. From almoſt the firſt diſcovery of the electric light, and the crackling with which it is emitted, a ſimilarity between it and the phenomena of thunder and lightning had been obſerved. This is taken notice of by Dr Wall, one of the firſt who viewed the electric light in any perfect manner. The Abbe Nollet, Mr Winckler, and others, alſo enumerated many reſemblances between the phenomena of electricity and thoſe of thunder; but they did not think of any method by which their ſuſpicions could be brought to the teſt of experience. This was firſt propoſed by Dr Franklin in 1750. He had before diſcovered the effects of pointed bodies in drawing off the electric matter more powerfully than others. This was ſuggeſted to him by one Mr Thomas Hopkinſon, who electrified an iron ball of three or four inches diameter with a needle faſtened to it, expecting to draw a ſtronger ſpark from the point of it; but was ſurpriſed to find little or none. Dr Franklin, improving on this hint, ſuppoſed that pointed rods of iron, fixed in the air when the atmoſphere was loaded with lightning, might draw from it the matter of the thunder-bolt, without noiſe or danger, into the body of the earth. His account of this ſuppoſition is given by himſelf in the following words. "The electric fluid is attracted by points. We do not know whether this property be in lightning; but ſince they agree in all the particulars in which we can already compare them, it is not improbable, that they agree likewiſe in this; let the experiment be made."

13
His ſuſpicion verified.

This ſuſpicion of Dr Franklin's was verified in 1752, and the diſcovery is perhaps the only one in the whole ſcience that hath not been the reſult of accident. The moſt active perſons were two French gentlemen, Meſſrs Dalibard and Delor. The former prepared his apparatus at Marly la Ville, ſituated five or ſix leagues from Paris; the other at his own houſe, on ſome of the higheſt ground in that capital. Mr Dalibard's machine conſiſted of an iron rod 40 feet long, the lower extremity of which was brought into a centry-box, where the rain could not come; while on the outſide it was faſtened to three wooden poſts by long ſilken ſtrings defended from the rain. This machine happened to be the firſt that was favoured with a viſit of the etherial fire. Mr Dalibard himſelf was not at home; but, in his abſence, he had entruſted the care of his apparatus to one Coiffier a joiner, who had ſerved 14 years among the dragoons, and on whoſe courage and underſtanding he could depend. This artiſan had all the neceſſary inſtructions given him; and was deſired to call ſome of his neighbours, particularly the curate of the pariſh, whenever there ſhould be any appearance of a thunder-ſtorm. At length the long expected event arrived. On Wedneſday the 10th of May 1752, between two and three in the afternoon, Coiffier heard a pretty loud clap of thunder. Immediately he ran to the machine, taking with him a vial furniſhed with a braſs wire; and preſenting the wire to the end of the rod, a ſmall ſpark iſſued from it with a ſnap like that which attends a ſpark from an electrified conductor. Stronger ſparks were afterwards drawn in the preſence of the curate and a number of other people. The curate's account of them was, that they were of a blue colour, an inch and an half in length, and ſmelled ſtrongly of ſulphur. In making them, he received a ſtroke on his arm a little below the elbow; but he could not tell whether it came from the braſs wire inſerted into the vial, or from the bar. He did not attend to it at the time; but the pain continuing, he uncovered

covered his arm when he went home in the preſence of Coiffier. A mark was perceived round it, ſuch as might have been made by a blow with the wire on his naked ſkin.

About a month after this, Dr Franklin himſelf had an opportunity of verifying his own hypotheſis. He was waiting for the erection of a ſpire in the city of Philadelphia, not imagining that a pointed rod of a moderate height could anſwer the purpoſe. At laſt it occurred to him, that by means of a common kite he could have a readier acceſs to the high regions of the atmoſphere than any other way whatever. Preparing, therefore, a large ſilk handkerchief, and two croſs ſticks of a proper length on which to extend it, he took the opportunity of the firſt approaching thunder-ſtorm to take a walk into a field where there was a ſhed convenient for his purpoſe. But dreading the ridicule which too commonly attends unſucceſsful attempts in ſcience, he communicated his intention to nobody but his ſon, who aſſiſted him in raiſing the kite. A conſiderable time elapſed before there was any appearance of ſucceſs. One very promiſing cloud had paſſed over the kite without any effect; when, juſt as he was beginning to deſpair, he obſerved ſome looſe threads of the hempen ſtring to ſtand erect and avoid one another juſt as if they had been ſuſpended by the conductor of a common electrical machine. On this he preſented his knuckle to a key which was faſtened to the ſtring, and thus obtained a very evident electric ſpark. Others ſucceeded even before the ſtring was wet; but when the rain had begun to deſcend, he collected electric fire pretty copiouſly. He had afterwards an inſulated iron rod to draw the lightning into his houſe; and performed almoſt every experiment with real lightning that had before been done with the artificial repreſentations of it by electrical machines.

14 Danger of making experiments with lightning.

Thus a new field was opened for philoſophers; but it was ſoon found, that experiments of this kind were not always to be made without danger. This very year, 1752, the Abbe Nollet publiſhed ſome cautions to thoſe who tried experiments on lightning. He had been informed by letters from Florence and Bologna, that ſome people there had received violent ſhocks while they drew ſparks from an iron bar electrified by thunder. One of his correſpondents informed him, that once, as he was endeavouring to faſten a ſmall chain with a copper ball at one of its extremities to a great chain which communicated with the bar at the top of the building, there came a flaſh of lightning which he did not ſee, but which affected the chain with a noiſe like that of wild-fire. The obſerver inſtantly received ſuch a ſhock, that the ball fell out of his hands, and he was ſtruck backwards four or five paces.

15 rofeſſor ichman lled by htning.

The greateſt inſtance of the danger of theſe experiments, however, was the death of Mr Richman profeſſor at Peterſburgh above-mentioned. This happened on the 6th of Auguſt 1753, as he was making experiments on lightning drawn into his own room. He had provided himſelf with an inſtrument for meaſuring the quantity of electricity communicated to his apparatus; and as he ſtood with his head inclined to it, Mr Solokow an engraver, who was near him, obſerved a globe of blue fire, as big as his fiſt, jump from the inſtrument, which was about a foot diſtant, to Mr Richman's head. The profeſſor was inſtantly dead, and Mr Solokow was alſo much hurt. The latter, however, could give no particular account of the way in which he was affected; for, at the time the profeſſor was ſtruck, there aroſe a ſort of ſteam or vapour, which entirely benumbed him, and made him ſink down to the ground, ſo that he could not even remember to have heard the clap of thunder, which was a very loud one. The globe of fire was attended with an exploſion like that of a piſtol; the inſtrument for meaſuring the electricity (called by the profeſſor an *electrical gnomon*), was broken to pieces, and the fragments thrown about the room. Upon examining the effects of the lightning in the profeſſor's chamber, they found the door-caſe half ſplit through, and the door torn off and thrown into the room. They opened a vein in the body twice, but no blood followed; after which, they endeavoured to recover life by violent friction, but in vain: upon turning the corpſe with the face downwards during the rubbing, an inconſiderable quantity of blood ran out of the mouth. There appeared a red ſpot on the forehead, from which ſpirted ſome drops of blood through the pores, without wounding the ſkin. The ſhoe belonging to the left foot was burſt open, and uncovering the foot at that part, they found a blue mark; from whence it was concluded, that the electric matter having entered at the head, made its way out again at that foot. Upon the body, particularly on the left ſide, were ſeveral red and blue ſpots reſembling leather ſhrunk by being burnt. Many more alſo became viſible over the whole body, and particularly over the back. That upon the forehead changed to a brownish red, but the hair of the head was not ſinged. In the place where the ſhoe was unripped, the ſtocking was entire; as was the coat every where, the waiſtcoat only being ſinged on the foreflap where it joined the hinder: but there appeared on the back of Mr Solokow's coat long narrow ſtreaks, as if red-hot wires had burned off the nap, and which could not well be accounted for.

When the profeſſor's body was opened next day, the cranium was very entire, having neither fiſſure nor contra-fiſſure: the brain was ſound; but the tranſparent pellicles of the wind-pipe were exceſſively tender, and eaſily rent. There was ſome extravaſated blood in it, as alſo in the cavities below the lungs. Thoſe of the breaſt were quite ſound; but thoſe towards the back of a browniſh black colour, and filled with more of the blood above mentioned. The throat, the glands, and the ſmall inteſtines, were all inflamed. The ſinged leather-coloured ſpots penetrated the ſkin only. In 48 hours the body was ſo much corrupted that they could ſcarce get it into a coffin.

16 Conductors uſed for preſerving houſes.

Since the diſcovery of the identity of lightning and the electric matter, long rods of iron or other metal have been made uſe of with a view to protect buildings from the danger of ſtrokes of lightning. A conſiderable diſpute has been carried on whether theſe rods ought to be pointed or not; but a committee of the royal ſociety have very lately determined it in favour of the former.

For ſome time, the ſcience of electricity ſeems to have been at a ſtand. Numberleſs improvements indeed have been made upon what was before diſcovered, but ſcarce any thing new hath been added. The only thing which can properly be reckoned a new diſcovery is that of the *electrophorus* by Signior Volta an Italian; which on many accounts may be reckoned the moſt ſurpriſing machine hitherto invented.

Sect. II. *Of the Phenomena of Electricity.*

These are ſo many, and ſo various, that, in order to avoid confuſion, it is neceſſary to divide them into diſtinct claſſes. It is, however, neceſſary, before entering upon any particular diſcuſſion of the phenomena, to ſay ſomething concerning the general method by which the electrical phenomena are made to appear, and the diſtinction between electrics and non-electrics.

17
Methods of producing electricity.

The moſt common method by which any ſubſtance is made to exhibit ſigns of electricity, is by rubbing it. Warming without rubbing, or blowing air violently upon it, will alſo in many caſes produce ſigns of electricity; and thus the diſcharge of cannon, blowing up of powder-magazines, &c. has been found to electrify glaſs-windows. But theſe appearances are comparatively ſlight; and the only effectual method by which any conſiderable effects can be produced, is by friction.

Every ſubſtance which, by any of the above-mentioned methods, is made to exhibit the ſigns of electricity, ſuch as attracting and repelling light bodies, emitting light, &c. will communicate the ſame properties to any other that touches it; and the latter is ſaid, during the time that theſe appearances continue, to be *electrified*.

18
Electrics and non-electrics.

Every ſubſtance which, by rubbing, warming, or blowing upon it, can be made to exhibit ſigns of electricity, is called an *electric per ſe;* and thoſe ſubſtances which cannot be made to exhibit any appearances of this kind, without touching another ſubſtance which already ſhews them, are called *non-electrics*, or conductors.

At firſt the catalogue of electric ſubſtances was very ſmall; but the induſtry of philoſophers hath now enlarged it to ſuch a degree, that, according to ſome, there is not a perfectly non-electric ſubſtance in nature. This, however, ſeems carrying the matter too far; for it is certain, that by rubbing a piece of metal as much as we pleaſe, it will never be made to exhibit the leaſt ſign of electricity while we hold it in our hands. If we fix it upon one of the ſubſtances generally called electrics, ſuch as a ſtick of ſealing-wax, a glaſs tube, &c. and then rub it, we ſhall in that caſe indeed produce ſigns of electricity; but here we certainly have a right to conclude, that it derives its electrical properties from its particular ſituation, and conſequently is not an *electric per ſe*.

19
Electric ſubſtances to be claſſed according to their different powers.

The catalogue of electric ſubſtances is, as we have already ſaid, prodigiouſly extenſive. We are not, however, to imagine, that all of them are equally fit for electrical experiments. There is, in this caſe, a very great diverſity; and ſome are found to be more proper for one purpoſe, and ſome for another. It is therefore very difficult to diſtinguiſh abſolutely between the ſtrength of one electric and another in all caſes: for a ſubſtance that cannot be made to emit ſparks but with great difficulty, will perhaps attract very ſtrongly; and another which attracts but weakly, will emit ſparks very vigorouſly.

This diſtinction, though hitherto not taken notice of, ſeems to be the moſt natural foundation for the claſſing of electric ſubſtances; and thus we may divide them in the following manner.

1. For exhibiting a permanent and very ſtrong attractive and repulſive power, ſilk is preferable to all other ſubſtances yet diſcovered.

2. For exhibiting the electric light, attraction and repulſion in quick ſucceſſion, and in general all the phenomena of electricity, in a very vigorous, though not a durable, manner, glaſs is preferable to every other body, and is the moſt generally made uſe of.

3. Thoſe ſubſtances commonly called *negative electrics*, ſuch as amber, gum-lac, ſulphur, roſin, and all the reſinous gums, exhibit electric appearances for the greateſt length of time; a ſingle friction being ſufficient to make them do ſo for months together, in favourable circumſtances. They are alſo very remarkable for the ſtrong electric power they communicate to conducting bodies which come into contact with them, and which they will continue to do for a great length of time, as if they contained an inexhauſtible ſupply of the fluid.

In this order, therefore, we ſhall treat of the electric powers of different ſubſtances. It is, however, ſtill neceſſary to premiſe an explanation of ſome terms made uſe of by electricians, without the frequent repetition of which, it is impoſſible to ſpeak intelligibly on the ſubject.

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Explanation of terms.

1. If any ſubſtance ſhall, by friction, or any other means, be made to exhibit ſigns of electricity, the electric virtue of that ſubſtance is ſaid to be *excited*, or, to avoid a circumlocution, the ſubſtance itſelf is ſaid to be excited. This phraſe differs from the other already mentioned, of being *electrified;* becauſe the latter implies that the electricity is communicated by ſome external body; whereas the being *excited* implies, that the electric power is originally inherent in the body itſelf.

2. Any non-electric, or conducting body, being placed upon an electric *per ſe*, and thus having its communication with other non-electrics cut off, is ſaid to be *inſulated*.—Here it muſt be obſerved, that the common air we breathe is an electric ſubſtance, ſo that a body is perfectly inſulated though it ſhould remain in contact with the air all round. The great uſe of inſulation, is to prevent any ſubſtance from loſing its electric virtue in ſuch a ſhort time as otherwiſe it would do; and becauſe this is found to be the caſe, it has been ſuppoſed that the current of electric matter is ſtopped by the electric or inſulating ſubſtance; whence electrics have alſo obtained the name of *non-conductors*.

3. There is obſerved a very ſtrange difference between the electricity produced by ſome bodies, and that exhibited by others. If two bodies electrified by glaſs are preſented to each other, they will mutually repel, or ſeparate to a greater diſtance than before. The ſame thing will happen to two bodies electrified by ſulphur, ſealing-wax, roſin, &c. But if a body electrified by glaſs is preſented to one electrified by ſulphur, or roſin, they will be mutually attracted; and when they meet, there will be no more ſigns of electricity in either of them, ſuppoſing both to have been equally electrified at firſt. That kind produced by the glaſs is called the *poſitive*, and that produced by the ſulphur or roſin the *negative*, electricity.—Formerly it was thought, that theſe two kinds of electricity were eſſentially diſtinct, and belonged to the glaſs and ſulphur without a poſſibility of alteration; but now it is found,. that glaſs may be made to elec-

trify *negatively*, and ſulphur *poſitively*, by very ſlight alterations in the ſurface, or the ſubſtances with which they are rubbed.—We ſhall now preſent the reader with an ample catalogue of electric ſubſtances, and the different kinds of electricity produced by them.

Cavallo's Electricity, p. 17.

21
Catalogue
f electric
ubſtances,
ith their
ifferent
owers.

Electric ſubſtances.	Quality of electricity.	Subſtances with which the electric is rubbed.
The back of a cat - -	Poſitive	Every ſubſtance hitherto tried.
Smooth glaſs	Poſitive	Every ſubſtance, except the back of a cat.
Rough glaſs	Poſitive	Dry oiled ſilk, ſulphur, or metals.
	Negative	Woollen-cloth, quills, wood, paper, ſealing-wax, white-wax, the human hand.
Tourmalin	Poſitive	Amber, or air blown upon it.
	Negative	Diamond, the human hand.
Hare's ſkin	Poſitive	Metals, ſilk, loadſtone, leather, hand, paper, baked wood.
	Negative	Other finer furs.
Black ſilk	Poſitive	Sealing-wax.
	Negative	Hare's, weaſel's, and ferret's ſkin, loadſtone, braſs, ſilver, iron, hand.
White ſilk	Poſitive	Black ſilk, metals, black cloth.
	Negative	Paper, hand, hare's, weaſel's ſkin.
Sealing-wax	Poſitive	Metals.
	Negative	Hare's, weaſel's, and ferret's ſkin, hand, leather, woollen-cloth, paper.
Baked wood	Poſitive	Silk.
	Negative	Flannel.

This table contains moſt of thoſe ſubſtances that exhibit the ſtrongeſt marks of electricity. The following is compoſed by Mr Henley, and contains a great number of ſubſtances whoſe electricity is much more equivocal. They were fixed or tied on the end of a ſtick of ſealing-wax; and excited by friction againſt a woollen garment, or a piece of ſoft black ſilk, by which means they became electrified as below. The ſtrongeſt in power are diſtinguiſhed by the letter s, and the weakeſt by the letter w.

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lxvii.
t 1.

METALS.

	Wool.	Silk.
A new guinea; a ſmooth ſixpence; a braſs ferule; tin, and tin-foil; enamelled copper, s; gilding on leather, s; lead ore; copper ore; iron ore; ſtream tin.	Neg.	Neg.
Milled lead; copper, s; a poliſhed ſteel button, s; a new ſilver ditto; a metal button gilt, s; tutenague ditto, s; iron.	Poſ.	Poſ.
Lead from a tea-cheſt, in which there is a mixture of tin, w.	Neg.	Poſ.
A gilt-button, baſket-pattern; the juncture at the end of a braſs ferule.	Poſ.	Neg.

ANIMAL SUBSTANCES.

	Wool.	Silk.
Tortoiſe-ſhell, w; ivory, s; bone, s; horn; lamb's-tooth; horſe's-hoof; deer's-hoof; muſcle of the leg of a deer, s; cartilage, s; ſpur of a young cock; bill, claw, and ſcale from the leg of a turkey, s; ſcale of a carp; the *chryſalis* of a moth, recent from the earth, cleanſed; *craſſamantum* of the human blood exſiccated, w; quills; claw of an unboiled lobſter; cowrie and ſeveral other ſmooth ſhells, s; ſhell of a hen's egg; tail of a ſmall fiſh; thigh of the elephant beetle; a ſmall beetle, ſmooth ſurface; human hair; red and white horſe's and bullock's hair, s; hog's briſtles, s; wool; ſilk from the worm, w; oyſter-ſhell, ſmooth ſurface;	Poſ.	Poſ.
Mother of pearl, and ſeveral other ſhells.	Neg.	Poſ.
Muſcle and cockle-ſhells, recent; a recent ſnail-ſhell, rough ſurface; *elytra* of the ſtag-beetle; oyſter-ſhell, rough ſurface.	Neg.	Neg.

VEGETABLES.

	Wool.	Silk.
Rind of cheſtnut, s; Barcelona nut-ſhell, s; caſhew nut, s; cocoa nut-ſhell poliſhed; Brazil; *lignum vitæ;* black ebony, s; box, w; cane, s; *quinquina*, or Peruvian bark, s; tamarind-ſtone; coffee-berry roaſted, s; nutmeg, s; ginger, s; white pepper, freed from the huſk, s; cinnamon, s; cloves, s; mace, s; all-ſpice, s; capſicum, both ſides of the pod, s; hemlock, s; a clove of garlic; ditto of eſchalot, freed from the huſk, s; a green onion, s; rue, s; cork, s; leaves of laurel, bay, yew, holly, roſemary, with their berries, s; parſley, s; leaf of turnip; ditto of Savoy cabbage, s; celery, s; ſago, s; thime, s; carrot; turnip; potatoe; an acorn, s; rind of Seville orange, s; a large Winſor bean, s; a white pea; root of the white lily; ſnow-drop root; ſeeds of gourd, melon, cucumber, w; a ſpecies of long moſs, w; an apple, s; down of the cotton-ruſh, w; ſea-flag; leaf of the American aloe, s; cotton, w.	Neg.	Neg.
Hemp; flax; ſtalk of the tobacco-leaf; ſpike, from the leaf of the American aloe; *palma-chriſti* nut; horſe-radiſh.	Neg.	Poſ.
A white kidney-bean, ſmooth ſurface; black negroe of the ſame; ſcarlet of the ſame.	Poſ.	Poſ.

	Wool.	Silk.
CORALLINES.		
Sea-fan, the horny part, w; rough coral, w.	Neg.	Poſ.
Spunge, w; coral poliſhed, w.	Neg.	Poſ.
SALTS.		
Allum, w. - -	Neg.	Neg.
Borax, Nitre purified, } ſmooth ſurfaces;	Poſ.	Poſ.
FOSSIL and MINERAL SUBSTANCES.		
Common pebble-ſtones of all colours, s; marble, s; pit-coal, s; black-lead, w; jet, s; *aſbeſtos;* mineralized ſulphur; thunder-bolt ſtone; *cornu-ammonis;* ſhark's-tooth; coat of petrifaction.	Neg.	Neg.
Several ſmooth native cryſtals; brown Iceland ditto; *talc*, s; Ceylon pebble, ſmooth and tranſparent; agate, s.; cornelian; amethyſt, s.	Poſ.	Poſ.
A ſpecimen of *gypſum*.	Neg.	Poſ.
ARTIFICIAL SUBSTANCES.		
Staffordſhire ware glazed; China ware, s; Wedgwood's ware glazed, s; whale's fin prepared, w; writing-paper; parchment, s; ſheep's gut.	Poſ.	Poſ.
Tobacco-pipe, s; Wedgwood's ware unglazed; elaſtic gum, s; hard under-cruſt of a leaf; a tallow-candle, w; oiled ſilk; painted paper, s; ſilver, burnt into glaſs, unburniſhed; pearl-barley, w; Indian ink, w; blue vitriol, s.	Neg.	Neg.
Dr Lewis's Glaſs porcelain.	Neg.	Poſ.

Here it muſt be obſerved, that a great number of the ſubſtances in Mr Henly's table, particularly metals, would have been totally incapable of excitation had they not been inſulated; and as they were rubbed againſt electrics *per ſe*, it is by no means fair to conclude that the metal was *excited*. It ſeems much more likely that the rubber only was excited, and communicatd its electricity to the metal. It muſt alſo be obſerved, that tho' there is a very remarkable difference between ſubſtances with regard to their non-electric or conducting power, yet there ſeems not to be a perfect electric in nature: for heat will deſtroy the electric power of glaſs, and every other ſuſtance; and, on the contrary, cold, if not attended with moiſture, renders every electric ſubſtance more electric than before. The uſe of warming an electric therefore, before excitation, is only to free it from the moiſture which may adhere to it.

§ 1. *Of the Electrical Phenomena from Silk.*

THIS ſubſtance was firſt diſcovered to be an electric by Mr Grey, in the manner we have already related*; but as it was by no means remarkable for emitting ſparks, which moſt commonly engages the attention, its electric virtues were almoſt entirely overlooked till the year 1759. At that time Mr Symmer preſented to the royal ſociety, ſome papers, containing a number of very curious experiments made with ſilk ſtockings, in ſubſtance as follows.

He had been accuſtomed to wear two pairs of ſilk ſtockings; a black and a white. When theſe were put off both together, no ſigns of electricity appeared; but on pulling off the black ones from the white, he heard a ſnapping or crackling noiſe, and in the dark perceived ſparks of fire between them. To produce this and the following appearances in great perfection, it was only neceſſary to draw his hand ſeveral times backward and forward over his leg with the ſtockings upon it.

22 Strong attraction and repulſion between electrified ſtockings.

When the ſtockings were ſeparated and held at a diſtance from each other, both of them appeared to be highly excited; the white ſtocking poſitively, and the black negatively. While they were kept at a diſtance from each other, both of them appeared inflated to ſuch a degree, that they exhibited the entire ſhape of the leg. When two black, or two white ſtockings, were held in one hand, they would repel one another with conſiderable force, making an angle ſeemingly of 30 or 35 degrees. When a white and black ſtocking were preſented to each other, they were mutually attracted; and if permitted, would ruſh together with ſurpriſing violence. As they approached, the inflation gradually ſubſided, and their attraction of foreign objects diminiſhed, but their attraction of one another increaſed; when they actually met they became flat, and joined cloſe together, like as many folds of ſilk. When ſeparated again, their electric virtue did not ſeem to be in the leaſt impaired for having once met; and the ſame appearances would be exhibited by them for a conſiderable time. When the experiment was made with two black ſtockings in one hand, and two white ones in the other, they were thrown into a ſtrange agitation, owing to the attraction between thoſe of different colours, and the repulſion between thoſe of the ſame colour. This mixture of attractions and repulſions made the ſtockings catch at each other at greater diſtances than otherwiſe they would have done, and afforded a very curious ſpectacle.

When the ſtockings were ſuffered to meet, they ſtuck together with conſiderable force. At firſt Mr Symmer found they required from one to 12 ounces to ſeparate them. Another time they raiſed 17 ounces, which was 20 times the weight of the ſtocking that ſupported them; and this in a direction parallel to its ſurface. When one of the ſtockings was turned inſide out, and put within the other, it required 20 ounces to ſeparate them; though at that time 10 ounces were ſufficient when applied externally. Getting the black ſtockings new dyed, and the white ones waſhed, and whitened in the fumes of ſulphur, and then putting them one within the other, with the rough ſides together, it required three pounds three ounces to ſeparate them. With ſtockings of a more ſubſtantial make, the coheſion was ſtill greater. When the white ſtocking was put within the black one, ſo that the outſide of the white was contiguous to the inſide of the black, they raiſed nine pounds wanting a few ounces; and when the two rough ſurfaces were contiguous, they raiſed 15 pounds, one pennyweight and a half. Cutting off the ends of the thread, and the tufts of ſilk which had been left in the inſide of the ſtockings, was found to be very unfavourable to theſe experiments.

Mr Symmer alſo obſerved, that pieces of white and black ſilk, when highly electrified, not only cohered with each other, but would alſo adhere to bodies with broad and even poliſhed ſurfaces, though theſe bodies were not electrified. This he diſcovered accidentally; having, without deſign, thrown a ſtocking out of his hand, which ſtuck to the paper-hangings of the room. He repeated the experiment, and found it would continue hanging near an hour. Having ſtuck up the black and white ſtockings in this manner, he came with another pair highly electrified; and applying the white to the black, and the black to the white, he carried them off from the wall, each of them hanging to that which had been brought to it. The ſame experiments held with the painted boards of the room, and likewiſe with the looking-glaſs, to the ſmooth ſurface of which both the white and the black ſilk appeared to adhere more tenaciouſly than to either of the former.

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* See n° 5.

23 Experiments on ibbons by Mr Cigna.

Similar experiments, but with a greater variety of circumſtances, were afterwards made by Mr Cigna of Turin, upon white and black ribbons. He took two white ſilk ribbons juſt dried at the fire, and extended them upon a ſmooth plain, whether a conducting or electric ſubſtance, was a matter of indifference. He then drew over them the ſharp edge of an ivory ruler, and found that both ribbons had acquired electricity enough to adhere to the plain; though while they continued there, they ſhewed no other ſign of it. When taken up ſeparately, they were both negatively electrified, and would repel each other. In their ſeparation, electric ſparks were perceived between them; but when again put on the plain, or forced together, no light was perceived without another friction. When, by the operation juſt now mentioned, they had acquired the negative electricity, if they were placed, not upon the ſmooth body on which they had been rubbed, but on a rough conducting ſubſtance, they would, on their ſeparation, ſhew contrary electricities, which would again diſappear on their being joined together. If they had been made to repel each other, and were afterwards forced together, and placed on the rough ſurface above-mentioned, they would in a few minutes be mutually attracted; the lowermoſt being poſitively, and the uppermoſt negatively electrified.

If the two white ribbons received their friction upon the rough ſurface, they always acquired contrary electricities. The upper one was negatively, and the lower one poſitively, electrified, in whatever manner they were taken off. The ſame change was inſtantaneouſly done by any pointed conductor. If two ribbons, for inſtance, were made to repel, and the point of a needle drawn oppoſite to one of them along its whole length, they would immediately ruſh together.

The ſame means which produced a change of electricity in a ribbon already electrified, would communicate electricity to one which had not as yet received it; viz. laying the unelectrified ribbon upon a rough ſurface, and putting the other upon it; or by holding it parallel to an electrified ribbon, and preſenting a pointed conductor to it. He placed a ribbon that was not quite dry under another that was well dried at the fire, upon a ſmooth plain; and when he had given them the uſual friction with his ruler, he found, that, in what manner ſoever they were removed from the plain, the upper one was negatively, and the lower one poſitively, electrified.—If both ribbons were black, all theſe experiments ſucceeded in the ſame manner as with the white. If, inſtead of the ivory ruler, he made uſe of any ſkin, or a piece of ſmooth glaſs, the event was the ſame; but if he made uſe of a ſtick of ſulphur, the electricities were in all caſes the reverſe of what they had been before the ribbon was rubbed, having always acquired the poſitive electricity.—When he rubbed them with paper either gilt or not gilt, the reſults were uncertain. When the ribbons were wrapped in paper gilt, or not gilt, and the friction was made upon the paper laid on the plain abovementioned, the ribbons acquired both of them the negative electricity. If the ribbons were one black, and the other white, whichever of them was laid uppermoſt, and in whatever manner the friction was made, the black generally acquired the negative, and the white the poſitive, electricity.

He alſo obſerved, that, when the texture of the upper piece of ſilk was looſe, yielding, and retiform, like that of a ſtocking, ſo that it could move, and be rubbed againſt the lower one, and the rubber was of ſuch a nature as could communicate but little electricity to glaſs, the electricity which the upper piece of ſilk acquired, did not depend upon the rubber, but upon the body on which it was laid. In this caſe, the black was always negative, and the white poſitive. But, when the ſilk was hard, rigid, and of a cloſe texture, and the rubber of ſuch a nature as would have imparted a great degree of electricity to glaſs, the electricity of the upper piece depended on the rubber. Thus, a white ſilk ſtocking rubbed with gilt paper upon glaſs became negatively, and the glaſs poſitively, electrified. But if a piece of ſilk of a firmer texture was laid upon a plate of glaſs, it was *always* electrified poſitively, and the glaſs negatively, if it was rubbed with ſulphur, and for the moſt part if it was rubbed with gilt paper.

If an electrified ribbon was brought near an inſulated plate of lead, it was attracted, but very feebly. On bringing the finger near the lead, a ſpark was obſerved between them, the ribbon was vigorouſly attracted, and both together ſhewed no ſigns of electricity. On the ſeparation of the ribbon, they were again electrified, and a ſpark was perceived between the plate and the finger.

When a number of ribbons of the ſame colour were laid upon a ſmooth conducting ſubſtance, and the ruler was drawn over them, he found, that, when they were taken up ſingly, each of them gave ſparks at the place where it was ſeparated from the other, as did alſo the laſt one with the conductor; and all of them were negatively electrified. If they were all taken from the plate together, they cohered in one maſs, which was negatively electrified on both ſides. If they were laid upon the rough conductor, and then ſeparated ſingly, beginning with the lowermoſt, ſparks appeared as before, but all the ribbons were electrified poſitively, except the uppermoſt.—If they received the friction upon the rough conductor, and were all taken up at once, all the intermediate ribbons acquired the electricity, either of the higheſt or loweſt, according as the ſeparation was begun with the higheſt or the loweſt. If two ribbons were ſeparated from the bundle at the ſame time, they clung together, and in that ſtate ſhewed no ſign of electricity, as one of them alone would have done. When they were ſeparated, the outermoſt one had acquired an electricity oppoſite to that of the bundle, but much weaker.

A number of ribbons were placed upon a plate of metal to which electricity was communicated by means of a glaſs globe, and a pointed conductor held to the other ſide of the ribbons. The conſequence was, that all of them became poſſeſſed of the electricity oppoſite to that of the plate, or of the ſame, according as they were taken off; except the moſt remote, which always kept an electricity oppoſite to that of the plate.

§ 2. *Of the phenomena produced by excited or electrified Glaſs.*

23 All kinds of glaſs not equally proper for electric experiments.

THAT glaſs is an electric ſubſtance, was firſt diſcovered by Dr Gilbert. It was for a long time, however, thought to poſſeſs but a very weak electric virtue; tho' now it is found to be one of the beſt, if not the very beſt electric as yet known. Notwithſtanding the many experiments made upon this ſubſtance, it is not yet aſcertained what kind of glaſs is moſt proper for electrical purpoſes. It has been obſerved, that the hardeſt and moſt completely vitrified glaſs is often a very bad electric, being ſometimes quite a conductor. Glaſs veſſels made for electrical purpoſes are often rendered fit for them by uſe and time, though very bad electrics when new. Mr Bergman of Upſal ſays, that very often, when his glaſs globes could not be excited to a ſufficient degree of ſtrength, he lined them with a thin coating of ſulphur, and that then they gave a much ſtronger poſitive electricity than before. In Italy, and other places, according to Mr Nollet, it is the cuſtom of electricians to put a coating of pitch or other reſinous matter on the inſide of their globes, which they ſay always makes them work well. He gives the preference to the cryſtal glaſs of England, Bohemia, &c. It ſeems doubtful, however, whether the common bottle glaſs does not anſwer equally well, or even better.

25 Leyden vial explained.

The moſt remarkable phenomenon producible by excited glaſs is that of the Leyden vial. It depends entirely upon the following property of glaſs, viz. that it is impoſſible to electrify the outſide of a glaſs poſitively, at leaſt to any conſiderable degree, without at the ſame time electrifying the inſide of it negatively: in like manner, it is impoſſible to electrify the outſide negatively; without at the ſame time electrifying the inſide poſitively. It is alſo the nature of glaſs and all other electric ſubſtances, when once electrified either by excitation or communication, to part with their electricity very ſlowly and gradually. Thus, ſuppoſing a tube, cylinder, or plate of glaſs, to be highly electrified; if a finger is brought near any part of it, a ſpark will be felt to ſtrike the finger with a ſnapping noiſe. Part of the electricity will then be diſcharged from the glaſs, but not all. If the finger is brought near another part of the glaſs, a ſimilar ſpark will be again produced; and ſo on, by moving the finger to different parts of the glaſs, till all its electricity is exhauſted.—It is the nature of conducting ſubſtances to diſcharge all their electricity at once, by a ſingle ſpark, if another conducting ſubſtance is brought near them. This being the caſe, therefore, it follows, that if every part of one ſide of a glaſs plate is covered over with a conducting ſubſtance, every point of the glaſs will give out its electricity to the conductor; and conſequently, if another conducting ſubſtance is brought near to that by which the glaſs is covered, the whole electric power in the glaſs ought to be diſcharged in one ſingle flaſh or large ſpark.

This would no doubt be the caſe, if it was poſſible to electrify the glaſs only on one ſide. But this is found to be impoſſible. No method hath yet been found of electrifying one ſide of a piece of glaſs poſitively, without electrifying the other negatively at the ſame time. There is therefore a neceſſity for taking off the electricity from both ſides of the glaſs at the ſame time. This can only be done by covering both ſides of the glaſs with a conducting ſubſtance, and preſenting other conductors to both ſides at the ſame time. Then the electricity of both is diſcharged in an inſtant. A ſtrong ſpark is perceived between both ſides of the coated glaſs and the conducting ſubſtances; and if a perſon holds one in each hand, he will, at the inſtant of the diſcharge, feel a very diſagreeable ſenſation, which cannot well be deſcribed, in his arms and breaſt: and this is ſaid to be receiving the *electric ſhock*.

If, inſtead of preſenting a conducting ſubſtance to both ſides of the plate at once, a finger is preſented to one ſide, ſuppoſe that which is poſitively electrified, and another ſubſtance very highly electrified poſitively is preſented to the negative ſide of the glaſs, a like diſcharge will enſue, but the ſhock will be much gentler than in the former caſe, and probably the electricity of the glaſs will not be all diſcharged. If two conducting ſubſtances, inſulated, ſuppoſe two cylinders of metal fixed upon ſticks of ſealing wax, or ſuſpended by ſilk threads, are brought to the ſides of the coated glaſs at the ſame time; each of them will receive a ſpark of poſitive or negative electricity, according as the ſide to which it was applied is poſitively or negatively electrified. When the metallic cylinders are taken away, they will communicate the electricity they have received to other bodies; and if again applied to the coated glaſs, they will receive ſparks as before; and thus the electricity of both ſides will be gradually diſcharged.

After the diſcharge has been once made, the glaſs is found in a ſhort time to recover its electricity, tho' in a ſmall degree. The ſide which was originally electrified poſitively, becomes electrified in the ſame manner the ſecond time, and ſo of the negative ſide. This ſecond electrification is called the *reſiduum* of a charge; and, where there is a large ſurface of coated glaſs, hath a very conſiderable degree of power. The ſame thing, which we have juſt now obſerved with regard to a flat ſurface of glaſs, takes place with tubes and vials, or glaſs veſſels of any kind; and it is always obſerved, that the thinneſt glaſs anſwers beſt for this purpoſe. The Leyden vial conſiſts of a glaſs vial, jar, or bottle, covered on the outſide and inſide with tinfoil, yet leaving an interval of two or three inches at top without any metallic covering, that the electricity of the one ſide may not be communicated to the other as faſt as it is collected. A more particular deſcription of it will be given when we ſpeak of the electric apparatus. The above will be ſufficient to render the following experiments intelligible.

26 Experiments on glaſs plates, by Mr Symmer.

Mr Symmer, when making the experiments we have already related, concerning the ſtrong coheſive power of electrified ſilk, was induced to try the coheſive power of electrified glaſs. For this purpoſe, he got two panes of common window-glaſs, the thinneſt and ſmootheſt he could meet with. He coated one of the ſides with tinfoil, leaving a ſpace uncovered near the edges. The uncovered ſides were then put together, and electricity communicated to one of the coatings by means of a machine. In conſequence of this, the other ſide, which was alſo coated, became electrified with an electricity oppoſite to the firſt, and both panes were charged with the electric power, as if they had been but one. After they had received a conſiderable degree of electric power, they cohered pretty ſtrongly together, but he had no apparatus by which the ſtrength of their coheſion could be meaſured. He then turned the plates upſide down; and diſcharging from his machine, poſitive electricity upon the negative ſide of the glaſs, both panes were immediately diſcharged, and their coheſion ceaſed. Placing two panes of glaſs, each of them coated on both ſides, one upon the other, each of them had a poſitive and negative ſide, by communicating electricity to one of them, and they did not cohere.

27
peri-
nts on
s plates
Mr Bec-
a.

In conſequence of theſe experiments made by Mr Symmer, and another (which we ſhall preſently give an account of) made at Pekin, Mr Beccaria made the following ones.—Having charged a coated plate of glaſs, he took off the coating from the negative ſide, and applied another uncoated and uncharged (or unelectrified) plate of glaſs cloſe to it. After this, putting a coating upon the uncharged glaſs, (ſo that the whole reſembled one coated plate, conſiſting of two laminæ), he made a communication between the two coatings. The conſequence of this was an exploſion, a diſcharge of the poſitive and negative electricity, and a coheſion of the plates. If the plates were ſeparated before the exploſion after they had been in conjunction for ſome time, the charged plate was poſitive on both ſides, and the uncharged one negative on both ſides.—If after the exploſion he ſeparated and joined them alternately, a ſmall circle of paper, placed under the uncharged plate, adhered to it upon every ſeparation, and was thrown off again upon every conjunction. This could be repeated even 500 times with once charging the plate. This is the experiment made at Pekin as above mentioned.

If, in theſe experiments, the charged plate was inverted, and the poſitive ſide applied to the uncharged plate, all the effects were exactly the reverſe of the former. If it was inverted ever ſo often, after remaining ſome time in contact with the uncharged plate, it would produce a change in the electricity. In the dark, a light was always ſeen upon the ſeparation of theſe plates.—Laying the two plates together like one, and coating the outſides of them, he diſcharged them both together; and at the diſtance of about four feet, he diſtinguiſhed ſix of the coloured rings mentioned by Sir Iſaac Newton, all parallel to one another, and nearly parallel to the edge of the coating. At the angles of the coatings the rings ſpread to a greater diſtance. Where the coatings did not quite touch the glaſs, the rings bent inwards; and where the coatings adhered very cloſe, they retired farther from them. Upon diſcharging theſe two plates, the coloured rings vaniſhed, and the electric coheſion ceaſed with them. On ſeparating the plates before the exploſion, that which had received the poſitive electricity was poſitive on both ſides, and the other negative on both ſides. If they were ſeparated after the exploſion, each of them was affected in a manner quite the reverſe. Upon inverting the plates, that which was the thinner appeared to be poſſeſſed of the ſtronger electricity, and brought the other plate to correſpond with it. Charging the two plates ſeparately, and taking off two of the coatings, ſo that two poſitive or two negative ſides might be placed together, there was no coheſion or exploſion. But joining a poſitive and a negative ſide, they immediately cohered; and a communication being formed on the outſide, there was an exploſion which increaſed the coheſion.

28
By Mr Henley.

Mr Henley repeated theſe experiments with ſucceſs, when he made uſe of plates of looking-glaſs, or window and crown glaſs; but when two plates of Nuremberg glaſs, commonly called *Dutch plates*, were uſed, the reſult was very different. Each of the plates, when ſeparated after charging, had a poſitive and a negative ſurface. When they were replaced, and a diſcharge made, by forming a communication between the two coatings, the electricity of all the ſurfaces was changed. It appeared, however, ſtill to be very ſtrong, and the plates continued to give repeated flaſhes of light when they were alternately cloſed, touched, and ſeparated, like the other plates above-mentioned. If a clean, dry, uncoated plate of looking-glaſs was placed between the coated plates, either of looking-glaſs or crown-glaſs, before they were charged, that uncoated plate was always found, upon ſeparating them after charging, to be electrified negatively on both ſides; but if it was put between the Dutch plates, it acquired, like them, a poſitive and negative electricity.

The following obſervation of Mr Æpinus is very remarkable. He preſſed cloſe together two pieces of looking-glaſs, each containing ſome ſquare inches; and found, that when they were ſeparated, and not ſuffered to communicate with any conductor, they acquired a ſtrong electricity, the one poſitive, and the other negative. When put together again, the electricity of both diſappeared; but not if either of them had been deprived of their electricity when they were aſunder: for in that caſe, the two, when united, had the electricity of the other.

29
Conducting power of glaſs tubes.

Theſe are the moſt remarkable experiments that have been made with electrified flat plates of glaſs. Tubes of the ſame matter, however, afford a variety of curious phenomena of a different nature. One very remarkable one is the conducting power of new flint-glaſs, which is moſt eaſily perceived in tubes, and on which Dr Prieſtley makes the following obſervations.—He ſeveral times got tubes made two or three yards long, terminating in ſolid rods. Theſe he took almoſt warm from the furnace, in the fineſt weather poſſible; and having immediately inſulated them, perceived that the electricity of a charged vial would preſently diffuſe itſelf from one end to the other; and this he thought would have been the caſe at any diſtance at which the experiment could have been made. When the ſame tubes were a few months older, the electricity could not be diffuſed along their ſurface farther than half a yard.

This diffuſive power of glaſs he thought proper to try in a different manner. A tube was procured of about three feet long, but of very unequal width. About three inches of the middle part of it were coated on both ſides. This coated part was afterwards charged, by communicating electricity to the inſide of it by means of a wire. The conſequence of this was, that not only the part through which the wire was introduced became ſtrongly electrical on the outſide, but at the oppoſite end, where there was neither coating nor wire, the fire crackled under the fingers as the tube was drawn through the hand, and a flame ſeemed continually to iſſue out at both ends, while it was at reſt and charged.—One end of this tube was broken and rough, the other was ſmooth.

Another tube was procured about three feet and an half in length, and very thin. It was about an inch in diameter, and cloſed at one end. Three inches of it were coated on both ſides, about nine inches below the mouth. This part being charged, the whole tube, to the very extremity of it, was ſtrongly electrical, crackling very loud when the hand was drawn along it, and emitting ſparks at about an inch diſtance all the way. After drawing the whole tube through the hand, all the electricity on the outſide was diſcharged; but, on putting a finger into the mouth, a light ſtreamed from the coating, both towards the finger, and towards the oppoſite end of the tube. After this, all the outſide of the tube was become ſtrongly electrical as before; and this electricity might be taken off and recovered many times without charging the tube anew, only it was weaker each time. Holding this tube by the coated part, and communicating electricity to the uncoated outſide, both ſides became charged; and, upon introducing a wire, a conſiderable exploſion was made. The diſcharge made the outſide ſtrongly electrical, and by taking off this electricity, the tube became ſenſibly charged.—The reſiduum of theſe charges was very conſiderable; and, in one tube, there was a reſiduum after 20 or 30 diſcharges.

By being kept for ſix or ſeven months, moſt of the tubes employed in theſe experiments loſt the abovementioned properties, and the electricity could no longer diffuſe itſelf upon their ſurfaces. At length they were all broken except one, which had been the moſt remarkable of the whole. With this old tube, the Doctor tried to repeat the above-mentioned experiments; but to no purpoſe. He then took it to a glaſs-houſe; and having made it red all over, its diffuſive property was reſtored as before.

He then tried two other tubes which had been made about ſix weeks, but without being uſed during all that time, and they anſwered exactly as if they had been quite new. The charge from a ſmall coated part diffuſed itſelf all over the tube; ſo that, at the diſtance of a yard from the coating, it gave ſparks to the finger of an inch long. On this occaſion he obſerved, that when his finger was brought to the tube about two inches above the coating, a great quantity of the diffuſed electricity was diſcharged; and his whole arm was violently ſhocked. The old tube, after being heated as abovementioned, ſhewed a prodigious diffuſive power. Upon charging a ſmall coated part, the electricity was diffuſed to the end of the tube; and it gave ſparks at the diſtance of an inch over every part of it. When it was drawn through the hand, in order to take off the diffuſed electricity, it inſtantly returned again, and the extremity of the tube would be highly electrified, even while its communication with the coating was cut off by the hand. The middle part of the tube alſo, which had been ofteneſt heated, had a much greater diffuſive power than any other. It was no ſooner taken off, than it appeared again; ſo that it gave a continual ſtream of fire. The quantity of reſiduum after a diſcharge of this tube was prodigious; ſo that the outſide coating would immediately after give almoſt a conſtant ſtream of fire for ſome time to any conducting ſubſtance placed near it.

The Doctor alſo obſerved, that in all the tubes which had the diffuſion, there was a conſiderable noiſe at the orifice when his hand was drawn from the extremity towards the coating, as if the tube had been gradually diſcharging itſelf. In the dark, the electric matter ſeemed perpetually to pour from the open end, or both ends if they were open; and whenever his hand was drawn over it, the fire ſtreamed from the coating to his hand in a very beautiful manner. The firſt time he charged any of theſe tubes after they had ſtood a while, the diffuſion was the moſt remarkable. It was leſſened by every ſucceſſive charge, and at laſt became exceedingly ſmall; but after the tube had ſtood a few hours uncharged, it was as vigorous as ever.

30
Cavallo's experiments wi
glaſs tubes.

Mr Cavallo hath alſo made ſome curious diſcoveries concerning glaſs-tubes. He took the hint from obſerving accidentally, that by agitating quickſilver in a glaſs tube hermetically ſealed, and in whoſe cavity the air was very much rarefied, the outſide of the tube was ſenſibly electrified. The electricity, however, was not conſtant, nor in proportion to the agitation of the quick-ſilver. In order to aſcertain the properties of theſe tubes, he conſtructed ſeveral of them, one of which is repreſented Plate XCIX. fig. 13. Its length was 31 inches, and its diameter ſomething leſs than half an inch. The quickſilver contained in it was about three fourths of an ounce; and in order to exhauſt it of air, one end of it was cloſed, while the quickſilver boiled in the other. Before this tube is uſed, it muſt be made a little warm and cleaned; then, holding it nearly horizontal, the quickſilver in it is ſuffered to run from one end to the other, by gently and alternately elevating and depreſſing its extremities. This operation immediately renders the outſide electrical; but with the following remarkable property, *viz.* that the end of the tube where the quickſilver actually ſtands is always poſitive, and all the remaining part of it negative. If elevating this poſitive end of the tube a little, the quickſilver runs to the oppoſite end which was negative, then the former inſtantly becomes negative, and the latter poſitive. The poſitive end has always a ſtronger electricity than the negative. If when one end of the tube, for inſtance, A, is poſitive, *i. e.* when the quickſilver is in it, that electricity is not taken off by touching it; then, on elevating this end A, ſo that the quickſilver may run to the oppoſite end B, it appears negatively electrified in a very ſmall degree. If by depreſſing it again it is a ſecond time rendered poſitive, and that poſitive electricity is not taken off, then, on elevating the end A again, it appears poſitive in a ſmall degree. But if, whilſt it is poſitive, its electricity is taken off, then on being elevated, it appears ſtrongly negative. When about two inches of each extremity of this tube is coated with tin-foil, as repreſented in the figure, that coating renders the electricities at the extremities more perceptible, ſo that ſometimes they will give ſparks to a conductor brought near them. Tubes whoſe glaſs is about one twentieth of an inch thick anſwer better for theſe experiments than any others.

31 urability the elec ic virtue glaſs.

We ſhall cloſe this account of the phenomena of excited glaſs, with ſome experiments which ſhow the durability of the electric virtue in that ſubſtance in certain circumſtances. Mr Canton procured ſome thin glaſs balls of about an inch and a half in diameter, with ſtems or tubes of eight or nine inches in length. He electrified them, ſome poſitively, and others negatively, on the inſide, and then ſealed them hermetically. Soon after, he found that they had loſt all ſigns of electricity; but holding them to the fire at the diſtance of five or ſix inches, they became ſtrongly electrical in a ſhort time, and more ſo as they cooled. Heating them frequently he found would diminiſh their power; but keeping one of them under water a week did not appear in the leaſt to impair it. That which he kept under water was charged on the 22d of September 1760, was heated ſeveral times before it was kept in water, and had been frequently heated afterwards; yet it ſtill retained its virtue to a conſiderable degree till the 31ſt of October following. The breaking of two of his balls gave him an opportunity of obſerving their thickneſs, which he found to be between ſeven and and eight parts of a thouſand of an inch. The balls retained their virtue for ſix years, but in a leſs degree. Mr Lullin alſo found, that a glaſs tube charged and hermetically ſealed, would ſhew ſigns of electricity when heated.

The moſt remarkable inſtances of the continuance of this power in glaſs, however, are thoſe given by Mr Henly in the 67th volume of the Phil. Tranſ. One is, of a ſmall bottle, which ſhewed ſigns of elecricity for 70 days after it had been charged, and ſtood in a cupboard all that time. The other is of a glaſs cylinder, which after excitation continued to ſhew very ſtrong ſigns of electricity from the 5th day of February to the 10th of March, though various methods had been uſed during that time to deſtroy the electric virtue. Theſe means always proved effectual when they were applied, and the cylinder for ſome time ſhewed no ſigns of electricity. They never failed however to return without any freſh excitation; and became ſtronger and weaker, nay, ſometimes quite vaniſhed and returned, without any viſible cauſe. In general, the electricity was weak when a fire was kept in the room, or when the door was kept open. When the wind blew from the north, the electricity was vigorous, and likewiſe after it had been for ſome time deſtroyed by flame. The cylinder, however, did not at all times retain its electric virtue for ſuch a length of time without excitation. Very often it would loſe all ſigns of electricity in 12 hours, and at other times in a fortnight, without returning till it was again excited.

§ 3. *The Phenomena of excited Sulphur, Gum-lac, Amber, Roſin, baked Wood,* &c.

The moſt remarkable property of theſe, as already mentioned, is the durability of their electric virtue when once excited. They are alſo capable of being excited by heat without any friction. This laſt property was diſcovered by Mr Wilcke, who diſtinguiſhes it by the name of *ſpontaneous electricity*. He melted ſulphur in an earthen veſſel, which he placed upon conductors: then, letting them cool, he took out the ſulphur, and found it ſtrongly electrical; but it was not ſo when it ſtood to cool upon electric ſubſtances. He then melted ſulphur in glaſs veſſels, whereby they both acquired a ſtrong electricity whether placed upon electrics or not; but a ſtronger in the former caſe than in the latter: they acquired a ſtronger virtue ſtill, if the glaſs veſſel was coated with metal. In theſe caſes, the glaſs was always poſitive and the ſulphur negative. It was particularly remarkable, that the ſulphur acquired no electricity till it began to cool and contract, and was the ſtrongeſt in the greateſt ſtate of contraction; whereas the electricity of the glaſs was, at the ſame time, the weakeſt; and was the ſtrongeſt of all when the ſulphur was ſhaken out before it began to contract, and acquired any negative electricity.

32 Experiments by Mr Wilcke, Æpinus, &c.

Purſuing experiments of this kind, he found, that melted ſealing-wax poured into glaſs acquired a negative electricity, but poured into ſulphur a poſitive one, leaving the ſulphur negative. Sealing-wax alſo, poured into wood, was negative, and the wood poſitive; but ſulphur poured into ſulphur, or into rough glaſs, acquired no electricity at all.

Similar experiments were alſo made by Mr Æpinus. He poured melted ſulphur into metal cups; and obſerved, that, when the ſulphur was cold, the cup and ſulphur together ſhewed no ſigns of electricity, but very ſtrong ſigns of it the moment they were ſeparated. The electricity always diſappeared when the ſulphur was replaced in the cup, and revived upon its being taken out. The cup had acquired a negative, and the ſulphur a poſitive, electricity; but, if the electricity of either of them had been taken off while they were ſeparate, they would both, when united, ſhew ſigns of that electricity which had not been taken off.

Mr Wilcke alſo made ſeveral curious experiments concerning the effects of different rubbers upon electric ſubſtances, the moſt remarkable of which is the following: viz. that ſulphur rubbed againſt metals was always poſitive; and this was the only caſe in which it was ſo. But, being rubbed againſt lead, it became negative, and the metal poſitive.

With regard to the perpetual attractive power of ſulphur, &c. which Mr Grey fancied he had diſcovered [*], the moſt remarkable example he gives is of a large cone of ſtone ſulphur, covered with a drinking glaſs in which it was made. This he ſaid would never fail to ſhew an attractive power when the glaſs was taken off. In fair weather, the glaſs would attract alſo; but not ſo ſtrongly as the ſulphur, which never failed to attract, let the wind or weather be ever ſo variable. This experiment has been repeated by Mr Henly, who ſays he has never known the ſulphur to fail of ſhewing ſigns of electricity on the removal of the glaſs. Gum lac, roſin, &c. agree in the ſame general properties with ſulphur, but do not become ſo ſtrongly electrified ſpontaneouſly, nor are they ſo eaſily excited.

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[*] See n° 6.

SECT. III. *Of the Apparatus neceſſary for exciting electricity, and communicating it to other bodies, &c.*

THE inſtruments moſt in uſe for this purpoſe are thoſe called *electrical machines*, of which there have been ſo many different forms, that it would be tedious and difficult to give only a very ſhort deſcription of them all. We ſhall therefore firſt lay down the moſt neceſſary rules for conſtructing electrical machines in general; and then give a particular deſcription of thoſe machines which are moſt generally uſeful, and contain all the improvements hitherto made.

§ 1. *Of the Conſtruction of Electrical Machines.*

Cavallo's Electricity.

The principal parts of the machine are the electric, the moving engine, and the prime conductor, *i. e.* an inſulated conductor, which immediately receives the electricity from the excited electric.

33 What ſubſtances are moſt proper.

Formerly, different kinds of electrics were uſed, as glaſs, roſin, ſulphur, ſealing-wax, &c. Their forms were alſo various, as globes, cylinders, ſpheroids, &c. The reaſon of this variety was, in the firſt place, that it was not then aſcertained what ſubſtance acted moſt powerfully; and ſecondly, in order to produce a poſitive or negative electricity at pleaſure. At preſent ſmooth glaſs only is uſed; for when the machine has an inſulated rubber, the operator may produce poſitive or negative electricity at his pleaſure, without changing the electric. In regard to the form of the glaſs, thoſe commonly uſed at preſent are globes and cylinders. The moſt convenient ſize for a globe, is from nine to twelve inches diameter. They are made with one neck, which is cemented to a ſtrong braſs cap in order to adapt them to a proper frame. The beſt cement for electrical purpoſes is made with two parts of roſin, two of bees-wax, and one of the powder of red okre. Theſe ingredients are melted, and mixed together in any veſſel over the fire; and afterwards kept for uſe. This kind of cement ſticks very faſt; and is much preferable to roſin only, as it is not ſo brittle, and at the ſame time inſulates equally well. The cylinders are made with two necks; they are uſed to the greateſt advantage without any axis; and their common ſize is from four inches diameter and eight inches long, to twelve inches diameter and two feet long, which are perhaps as large as the workmen can conveniently make them. The glaſs generally uſed is the beſt flint; though it is not yet abſolutely determined which kind of metal is the beſt for electrical globes or cylinders. The thickneſs of the glaſs ſeems immaterial, but perhaps the thinneſt is preferable. It has often happened, that glaſs globes, and cylinders, in the act of whirling, have burſt in innumerable pieces, with great violence, and with ſome danger to the by-ſtanders. Thoſe accidents are ſuppoſed to happen when the globes, or cylinders, after being blown, are ſuddenly cooled. It will therefore be neceſſary to enjoin the workman to let them paſs gradually from the heat of the glaſs-houſe, to the atmoſpherical temperature.

It has been long queſtioned, whether a coating of ſome electric ſubſtance, as roſin, turpentine, &c. on the inſide ſurface of the glaſs, has any effect to increaſe its electrical power; but now it ſeems pretty well determined, that if it does not increaſe the power of a good glaſs globe or cylinder, at leaſt it does conſiderably improve a bad one.

34 Compoſition for coating globes.

The moſt approved compoſition for lining glaſs globes, or cylinders, is made with four parts of Venice turpentine, one part of roſin, and one part of bees-wax. This compoſition muſt be boiled for about two hours over a gentle fire, and muſt be ſtirred very often: afterwards it is left to cool, and reſerved for uſe. When a globe or cylinder is to be lined with this mixture, a ſufficient quantity of it is to be broken into ſmall pieces, and introduced into the glaſs; then, by holding the glaſs near the fire, the mixture is melted, and equally ſpread over all its internal ſurface, to about the thickneſs of a ſixpence. In this operation care muſt be taken, that the glaſs be made hot gradually, and be continually turned, ſo as to be heated equally in all parts, otherwiſe it is apt to break in the operation.

35 How the machine is to be ſet in motion.

In reſpect to the engine which is to give motion to the electric; multiplying wheels have been generally uſed, which, properly adapted, might give the electric a quick motion, while they are conveniently turned by a winch. The uſual method is, to fix a wheel on one ſide of the frame of the machine, which is turned by a winch, and has a groove round its circumference. Upon the braſs cap of the neck of the glaſs globe, or one of the necks of the cylinder, a pulley is fixed, whoſe diameter is about the third or fourth part of the diameter of the wheel: then a ſtring or ſtrap is put over the wheel and the pulley; and by theſe means, when the winch is turned, the globe or cylinder makes three or four revolutions, for one revolution of the wheel. There is an inconvenience generally attending this conſtruction, which is, that the ſtring is ſometimes ſo very ſlack, that the machine cannot work. To remedy this inconvenience, the wheel ſhould be made moveable with reſpect to the electric, ſo that by means of a ſcrew it might be fixed at the proper diſtance; or elſe the pulley ſhould have ſeveral grooves of different radiuſes on its circumference.

It has been cuſtomary with ſome, to turn the cylinder ſimply with a winch, without any accelerated motion; but that ſeems not ſufficient to produce the greateſt electric power the glaſs is capable of giving; for the globe or cylinder ſhould properly make about ſix revolutions in a ſecond, which is more than can be conveniently done with the winch only. This method, however, on account of its ſimplicity and eaſy conſtruction, ſhould not be diſregarded, and it may be conveniently uſed when no very great power is required.

Inſtead of the pulley and the ſtring as above deſcribed, a wheel and pinion, or a wheel and an endleſs ſcrew, has been alſo uſed. This conſtruction anſwers perhaps as well as any other: but it muſt be conſtructed with great nicety; otherwiſe it is apt to make a diſagreeable rattling, and, without frequent oiling, ſoon wears away by the great friction of its parts.

36 Conſtruction of the rubber.

The next thing belonging to the electrical machine, neceſſary to be deſcribed, is the rubber which is to excite the electric. The rubber, as it is now made, is nothing more than a ſilk-cuſhion ſtuffed with hair; and over this cuſhion is put a piece of leather, on which ſome amalgam has been rubbed ſo as to ſtick as faſt as poſſible to the leather. This amalgam has been found to excite ſmooth glaſs the moſt powerfully of any thing yet tried. That generally uſed, is made with two parts of quickſilver and one of tin-foil, with a ſmall quantity of powdered chalk, mixed together until they become a maſs like paſte. But an amalgam of quickſilver and biſmuth is now found to be much more powerful. Some time ago it was generally uſed, and it is now cuſtomary alſo, to make the rubber of red baſil ſkin ſtuffed with hair; but the ſilk one, as above deſcribed (which is an improvement of Dr Nooth) is much preferable. If this ſilk cuſhion, on account of adapting it to the ſurface of the glaſs, is to be fixed upon a metal plate, then care ſhould be taken to make the plate free from ſharp points, edges, or corners; and it ſhould be as much as poſſible concealed, or covered with ſilk. In ſhort, to conſtruct the rubber properly, it muſt be made in ſuch a manner, that the ſide of it, which the ſurface of the glaſs enters in whirling, may be as perfect a conductor as it can be made, in order to ſupply electricity as quick as poſſible; and the oppoſite part ſhould be as much a non-conductor as poſſible, in order that none of the fluid accumulated upon the glaſs may return back to the rubber; which has been found by experiment to be the caſe when the rubber is not made in a proper manner.

The rubber ſhould be ſupported by a ſpring, by which means it may eaſily ſuit any inequalities that may be found on the ſurface of the glaſs; and by a ſcrew, it may be made to preſs harder or ſofter as occaſion requires. It ſhould alſo be inſulated, in whatever manner is moſt convenient; for, whenever inſulation is not required, a chain or wire, &c. may be occaſionally hung upon it, and thus communicate with the earth, or with any other body, at pleaſure; whereas, when there is not a contrivance for inſulating the rubber, many of the moſt curious experiments in electricity will never be performed with the machine.

37 ime conductor, &c.

We come now to conſider the prime conductor, or firſt conductor; which is nothing more than an inſulated conducting ſubſtance furniſhed with one or more points at one end, in order to collect the electricity immediately from the electric. When the conductor is of a moderate ſize, it is uſual to make it of hollow braſs; but when it is very large, then, on account of the price of the materials, it is made of paſteboard covered with tinfoil or gilt paper. The conductor is generally made cylindrical; but let the form be what it will, it ſhould always be made perfectly free from points, or ſharp edges: and if holes are to be made in it, which on many accounts are very convenient, they ſhould be well rounded, and made perfectly ſmooth. Further, that end of the prime conductor which is at the greateſt diſtance from the electric, ought to be made larger than the reſt, as the ſtrongeſt exertion of the electric fluid in eſcaping from the conductor is always at that end.

It has been conſtantly obſerved, that the larger the prime conductor is, the longer and denſer ſpark can be drawn from it; and the reaſon of this is, that the quantity of electricity diſcharged in a ſpark, is nearly proportional to the ſize of the conductor; on this account, the prime conductor is now made much larger than what was formerly uſed. Its ſize, however, may be ſo large, that the diſſipation of the electricity from its ſurface, may be greater than what the electric can ſupply; in which caſe, ſo large a conductor would be nothing more than an unweildy and diſagreeable incumbrance.

Before we quit the electrical machine, it ſhould be obſerved, that, beſides the above-mentioned parts, it is neceſſary to have a ſtrong frame to ſupport the electric, the rubber, and the wheel. The prime conductor ſhould be ſupported by ſtands with pillars of glaſs, or baked wood; and not by ſilk ſtrings, which admit of continual motion. In ſhort, the machine, the prime conductor, and any other apparatus actually uſed, ſhould be made to ſtand as ſteady as poſſible, otherwiſe many inconveniences will ariſe.

Beſides the electrical machine, the electrician ſhould be provided with glaſs tubes of different ſizes, a pretty large ſtick of ſealing-wax, or a glaſs tube covered with ſealing-wax, for the negative electricity. He ſhould, at leaſt, not be without a glaſs tube about three feet long and one inch and a half in diameter. This tube ſhould be cloſed at one end, and at the other end ſhould have fixed a braſs cap with a ſtop-cock; which is uſeful in caſe it ſhould be required to condenſe or rarify the air within the tube.

The beſt rubber for a tube of ſmooth glaſs, is the rough ſide of black oiled ſilk, eſpecially when it has ſome amalgam rubbed upon it; but the beſt rubber for a rough glaſs tube, a ſtick of baked wood, ſealing-wax, or ſulphur, is ſoft new flannel.

38 Directions for coating jars, &c.

The inſtruments neceſſary for the accumulation of electricity, are coated electrics; among which, glaſs coated with conductors obtains the principal place: on account of its ſtrength, it may be formed into any ſhape, and it will receive a very great charge. The form of the glaſs is immaterial with reſpect to the charge it will contain; its thickneſs only is to be conſidered: for the thinner it is, the higher charge it is capable of receiving; but it is at the ſame time more ſubject to be broken: for this reaſon, therefore, a thin coated jar or plate may be uſed very well by itſelf, and it is very convenient for many experiments; but when large batteries are to be conſtructed, then it is neceſſary to uſe glaſs a little thicker, and care ſhould be taken to have them perfectly well annealed. If a battery is required of no very great power, as containing about eight or nine ſquare feet of coated glaſs, common pint or half-pint phials may be made uſe of. They may be eaſily coated with tin-foil, ſheet-lead, or gilt paper, on the outſide, and braſs-filings on the inſide; they occupy a ſmall ſpace, and, on account of their thinneſs, hold a very good charge. But when a large battery is required, then theſe phials cannot be uſed, for they break very eaſily; and for that purpoſe, cylindrical glaſs jars of about 15 inches high, aud four or five inches in diameter, are the moſt convenient.

When glaſs plates or jars, having a ſufficiently large opening, are to be coated, the beſt method is to coat them with tin-foil on both ſides, which may be fixed upon the glaſs with varniſh, gum-water, bees-wax, &c. but in caſe the jars have not an aperture large enough to admit the tin-foil, and an inſtrument to adapt it to the ſurface of the glaſs, then braſs-filings, ſuch as are ſold by the pin-makers, may be advantageouſly uſed; and they may be ſtuck with gum-water, bees-wax, &c but not with varniſh, for this is apt to be ſet on fire by the diſcharge. Care muſt be taken that the coatings do not come very near the mouth of the jar, for that will cauſe the jar to diſcharge itſelf. If the coating is about two inches below the top, it will in general do very well; but there are ſome kinds of glaſs, eſpecially tinged glaſs, that, when coated and charged, have the property of diſcharging themſelves more eaſily than others, even when the coating is five or ſix inches below the edge. There is another ſort of glaſs, like that of which Florence flaſks are made, which, on account of ſome unvitrified particles in its ſubſtance, is not capable of holding the leaſt charge; on theſe accounts, therefore, whenever a great number of jars are to be choſen for a large battery, it is adviſeable to try ſome of them firſt, ſo that their quality and power may be aſcertained.

39 Another ſubſtance capable of anſwering the purpoſe of glaſs.

Electricians have often endeavoured to find ſome other electric, which might anſwer better than glaſs for this purpoſe, at leaſt be cheaper; but, except Father Beccaria's method, which may be uſed very well, no remarkable diſcovery has been made relating to this point. He took equal quantities of very pure colophonium, and powder of marble ſifted exceedingly fine, and kept them in a hot place a conſiderable time, where they became perfectly free from moiſture: he then mixed them, and melted the compoſition in a proper veſſel over the fire; and, when melted, poured it upon a table, upon which he had previouſly ſtuck a piece of tin-foil, reaching within two or three inches of the edge of the table. This done, he endeavoured with a hot iron to ſpread the mixture all over the table as equally as poſſible, and to the thickneſs of one tenth of an inch: he afterwards coated it with another piece of tin-foil reaching within about two inches of the edge of the mixture: in ſhort, he coated a plate of this mixture like a plate of glaſs. This coated plate, from what he ſays, ſeems to have had a greater power than a glaſs plate of the ſame dimenſions, even when the weather was not very dry: and if it is not ſubject to break very eaſily by a ſpontaneous diſcharge, it may be very conveniently uſed; for it doth not very readily attract moiſture, and conſequently may hold a charge of electricity better, and longer, than glaſs: beſides, if broken, it may be repaired by a hot iron; but glaſs, when broke, can never be repaired.

40 Diſcharging rod, electrometers, &c,

When a jar, a battery, or in general a coated electric, is to be diſcharged, the operator ſhould be provided with an inſtrument called the *diſcharging rod*, which conſiſts of a metal rod ſometimes ſtraight, but more commonly bended in the form of a C: they are made alſo of two joints, ſo as to open like a kind of compaſſes. This rod is furniſhed with metal knobs at its extremities, and has a non-conducting handle, generally of glaſs or baked wood, faſtened to its middle. When the operator is to uſe this inſtrument, he holds it by the handle; and touching one of the coated ſides of the charged electric with one knob, and approaching the other knob to the other coated ſide, or ſome conducting ſubſtance communicating with it, he completes the communication between the two ſides, and diſcharges the electric.

The inſtruments to meaſure the quantity, and aſcertain the quality, of electricity, are commonly called *electrometers*, and they are of four ſorts: 1. The ſingle thread; 2. the cork or pith balls; 3. the quadrant; and, 4. the diſcharging electrometer. The ſecond ſort of electrometer, *i. e.* the cork-balls electrometer, was invented by Mr Canton; the diſcharging electrometer was invented by Mr Lane, and hath been improved by Mr Henly; another on a different principle by Mr Kinnerſley; and the quadrant electrometer, which is of lateſt invention, is a contrivance of Mr Henly.

Beſides the apparatus above deſcribed, there are ſeveral other inſtruments uſeful for various experiments; but theſe will be deſcribed occaſionally. The electrician, however, ought to have by him, not only a ſingle coated jar, a ſingle diſcharging rod, or, in ſhort, only what is neceſſary to perform the common experiments; but he ſhould provide himſelf with ſeveral plates of glaſs, with jars of different ſizes, with a variety of different inſtruments of every kind, and even tools for conſtructing them; in order that he may readily make ſuch new experiments as his curioſity may induce him to try, or that may be publiſhed by other ingenious perſons who are purſuing their reſearches in this branch of philoſophy.

§ 2. *Deſcription of the moſt uſeful Electrical Machines.*

41 Deſcription of Dr Prieſtley's machine.

THE firſt which may be mentioned is that deſcribed by Dr Prieſtley in his hiſtory of electricity; which, on account of its extenſive uſe, may be deſervedly called a *univerſal electrical machine*.—The baſis conſiſts of two oblong boards, which are kept in a ſituation parallel to one another, about four inches aſunder, by two ſmall pieces of board properly adapted to that purpoſe. Theſe boards, when ſet horizontally upon a table, and there fixed by faſtening the lower of them with iron cranks, form the ſupport of two perpendicular pillars of baked wood, and of the rubber of the machine. One of the pillars, together with the ſpring ſupporting the rubber, ſlides in a groove, which reaches almoſt the whole length of the upper board: and, by means of ſcrews, may be placed at any required diſtance from the other pillar, which is fixed, being let through a mortice in the upper board, and ſtrongly faſtened to the lower. In theſe two pillars are ſeveral holes for the admittance of the ſpindles of different globes; and as they may be ſituated at any diſtance from one another, they may be adapted to receive not only globes, but alſo cylinders, or ſpheroids of different ſizes. In this machine, ſays Dr Prieſtley, more than one globe or cylinder may be uſed at once, by fixing them one above the other in the different holes of the pillars; and, by adapting to each a proper pulley, they may be whirled all at once, and their power united in order to increaſe the electricity (A): but in this conſtruction different rubbers cannot be conveniently applied to them all; which is a capital imperfection.

The rubber ought to be made as above-directed. It is ſupported by a ſocket, which receives the cylindrical axis of a round and flat piece of baked wood, the oppoſite part of which is inſerted into the ſocket of a bent ſteel ſpring. Theſe parts are eaſily ſeparated, ſo that

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(A) When ſeveral globes are uſed at once, and their power united, it has been found by experiment, that the electricity does not increaſe in proportion to their number, although it is more than what may be produced by a ſingle globe. Plate CII. fig. 1. ſhews a machine of this kind formerly uſed by Dr Watſon.

that the rubber, or the piece of wood that ſerves to inſulate it, may be changed at pleaſure. The ſpring admits of a twofold alteration of poſition. It may be either ſlipped along the groove, or moved in the contrary direction (the groove being wider than the ſcrew which faſtens the ſpring), ſo as to give it every deſirable poſition with reſpect to the globe or cylinder; and it is, beſides, furniſhed with a ſcrew, which makes it preſs harder or lighter, as the operator chooſes.

The wheel of this machine is fixed to the table; it has ſeveral grooves, for admitting more ſtrings than one, in caſe that two or three globes or cylinders are uſed at a time; and as it is diſengaged from the frame of the machine, the latter may be ſcrewed at different diſtances from the former, and thus ſuited to the variable length of the ſtring.

The prime conductor is hollow copper, made in the ſhape of a pear, ſituated with its neck upwards, and with its bottom or rounder part upon a ſtand of baked wood; and an arched wire proceeds from its neck, having an open ring at its end, in which ſome ſmall pointed wires are hung, that, by playing lightly upon the electric, collect the electric fluid from it.

42 Dr In- nhouſz's. Next to Dr Prieſtley's machine is one invented by Dr Ingenhouſz, and which for its ſimplicity and conciſeneſs makes a fine contraſt with the former.—This machine conſiſts of a circular glaſs plate about one foot diameter, which is turned vertically by a winch fixed to the iron axis that paſſes through its middle; and it is rubbed by four cuſhions, each about two inches long, ſituated at the oppoſite ends of the vertical diameter. The frame conſiſts of a bottom board, about a foot ſquare, or a foot long and ſix inches broad, which, when the machine is to be uſed, may be faſtened by an iron crank to the table. Upon this board two other ſlender and ſmaller ones are raiſed, which lie parallel to one another, and are faſtened together at their top by a ſmall piece of wood. Theſe upright boards ſupport in their middle the axis of the plate, and to them the rubbers are faſtened. The conductor is of hollow braſs; and from its extremities branches are extended, which, coming very near the extremity of the glaſs, collect the electricity from it.

The power of this machine is perhaps more than a perſon would imagine by looking at it. It may be objected, that this conſtruction will not eaſily admit of the rubbers being inſulated, nor conſequently be adapted to a great variety of experiments: but at the ſame time it muſt be allowed, that it is very portable, that it is not very liable to be out of order, and that it has a power ſufficiently ſtrong for phyſical purpoſes; on which account it may be conveniently uſed.

43 he moſt oved The laſt machine we ſhall deſcribe, is that repreſented in fig. 1. (Plate XCIX.) which has all the improvements hitherto made, except that it is not capable of admitting different kinds, or more than one electric; but which, indeed, it ſeems not to ſtand in need of. The electric power of ſuch a machine is equal to what may be obtained by any other conſtruction; and at the ſame time its ſize, being neither remarkably large, nor at all inconvenient, renders it the completeſt hitherto contrived.—Theſe machines are made and ſold by Mr George Adams, in Fleet-ſtreet, London, philoſophical inſtrument-maker to his majeſty.

The frame of this machine conſiſts of the bottom board ABC, which, when the machine is to be uſed, is faſtened to the table by two iron cranks, one of which appears in the figure near C. Upon the bottom board are perpendicularly raiſed two ſtrong wooden pillars KL, and AH, which ſupport the cylinder and the wheel. From one of the braſs caps of the cylinder FF, an axle of ſteel proceeds, which paſſes quite through a hole in the pillar KL, and has on this ſide of the pillar a pulley I fixed upon its ſquare extremity. Upon the circumference of this pulley there are three or four grooves, in order to ſuit the variable length of the ſtring *ab*, which goes round one of them, and round the groove of the wheel D. The other cap of the cylinder has a ſmall cavity, which fits the conical extremity of a ſtrong ſcrew, that proceeds from the pillar H. The wheel D, which is moved by the handle E, turns round a ſtrong axle, proceeding from almoſt the middle of the pillar KL.

The rubber G of this machine is on each end two inches ſhorter than the cylinder, (*i.e.* the cylinder excluſive of the necks), and it is made to rub about one fourth part of the cylinder's circumference. It conſiſts of a thin quilted cuſhion of ſilk, ſtuffed with hair, and faſtened by ſilk ſtrings upon a piece of wood, which is properly adapted to the ſurface of the cylinder. From the upper extremity of the cuſhion proceeds a piece of oiled ſilk, that covers almoſt all the upper part of the cylinder; and to the lower extremity of the cuſhion, or rather of the piece of wood to which the cuſhion is tied, a piece of leather is faſtened, which is turned over the cuſhion, *i. e.* ſtands between it and the ſurface of the cylinder. Upon this leather, which reaches from the lower to almoſt the upper extremity of the cuſhion, ſome of the above-deſcribed amalgam is to be worked, ſo as to be forced as much as poſſible into its ſubſtance. This rubber is ſupported by two ſprings, ſcrewed to its back, and from which it may be eaſily unſcrewed when occaſion requires. The two ſprings proceed from the wooden cap of a ſtrong glaſs pillar (B), perpendicular to the bottom board of the machine. This pillar has a ſquare wooden baſis, that ſlides in two grooves in the bottom board ABC, upon which it is faſtened by a ſcrew. In this manner the glaſs pillar may be faſtened at any required diſtance, and in conſequence the rubber may be made to preſs harder or lighter upon the cylinder. The rubber in this manner is perfectly inſulated; and when inſulation is not required, a chain with a ſmall hook may be hung to it, ſo as to have a regular communication with the piece of leather; the chain then falling upon the table, renders the rubber uninſulated.

Fig. 2. repreſents the prime conductor AB belonging to this machine. This is of hollow braſs; and is ſupported by two glaſs pillars varniſhed, which by two braſs ſockets are fixed in the board CC. This conductor receives the electric fluid through the points of the collector L, which are ſet at about half an inch diſtance from the ſurface of the cylinder of the machine.

(B) This glaſs pillar, as well as the glaſs feet of inſulating ſtools in general, ſhould be covered with varniſh, or rather with ſealing-wax; otherwiſe they will inſulate very imperfectly, on account of the moiſture that they attract from the air in damp weather.

44 Of exciting poſitive and negative electricity.

If the handle E, fig. 1. of the wheel, be turned, (and, on account of the rubber, it ſhould be turned always in the direction of the letters a b c) this machine, ſtanding in the ſituation that is repreſented in the figure, will give poſitive electricity, *i. e.* the prime conductor will be electrified poſitively, or overcharged with electric fluid; for, by the action of rubbing, the cylinder pumps as it were the fluid from the rubber, and every other body properly connected with it, and gives it to the prime conductor. But if a negative electricity is required, then the chain muſt be removed from the rubber and hung to the prime conductor; for in this caſe the electricity of the prime conductor will be communicated to the ground, and the rubber remaining inſulated will appear ſtrongly negative. Another conductor equal to the conductor A B, fig. 2. may be connected with the inſulated rubber, and then the operator may obtain as ſtrong negative electricity from this, as he can poſitive from the conductor A B, fig. 2.

45 Different electrometers deſcribed.

Fig. 4. repreſents a ſtand ſupporting the electrometers D D C C. B is the baſis of it, made of common wood. A is a pillar of wax, glaſs, or baked wood. To the top of the pillar, if it be of wax or glaſs, a circular piece of wood is fixed; but if the pillar be of baked wood, that may conſtitute the whole. From this circular piece of wood proceed four arms of glaſs, or baked wood, ſuſpending at their ends four electrometers, two of which D D are ſilk threads about eight inches long, ſuſpending each a ſmall downy feather at its end. The other two electrometers C C are thoſe with very ſmall balls of cork, or of the pith of alder; and they are conſtructed in the following manner. *a b* is a ſtick of glaſs about ſix inches long, covered with ſealing-wax, and ſhaped at top in a ring: from the lower extremity of this ſtick proceed two fine linen threads (c) *c c* about five inches long, each ſuſpending a cork or pith-ball *d* about one-eighth of an inch in diameter. When this electrometer is not electrified, the threads *c c* hang parallel to each other, and the cork-balls are in contact; but when electrified, they repel one another, as repreſented in the figure. The glaſs ſtick *a b* ſerves for an inſulating handle, by which the electrometer may be ſupported when it is uſed without the ſtand A B.

Another ſpecies of the above electrometer is repreſented in fig. 3. which conſiſts of a linen thread, having at each end a ſmall cork-ball. This electrometer is ſuſpended by the middle of the thread on any conductor proper for the purpoſe, and ſerves to ſhow the kind and quantity of its electricity.

Fig. 7. repreſents Mr Henly's quadrant electrometer fixed upon a ſmall ſtand, from which it may be occaſionally ſeparated and fixed upon the prime conductor, or in any other place at pleaſure. This electrometer conſiſts of a perpendicular ſtem formed at the top like a ball, and furniſhed at its lower end with a braſs ferule, by which it may be fixed in one of the holes of the prime conductor, or in its proper ſtand, as occaſion requires. To the upper part of the ſtem or pillar, a graduated ivory ſemicircle is fixed; about the middle of which is a braſs arm, which contains a pin, or the ſmall axis of the index. The index conſiſts of a very ſlender ſtick, which reaches from the centre of the graduated ſemicircle to the braſs ferule, and at its lower extremity is faſtened a ſmall cork-ball, nicely turned in a lathe.

The propereſt wood, for the purpoſe of making the pillar and index of this electrometer, is box; and this pillar and index ſhould be well rounded, and made as ſmooth as poſſible. When this electrometer is not electrified, the index hangs parallel to the pillar, as in fig. 7.: but, when it is electrified, the index recedes more or leſs, according to the quantity of electricity, from the ſtem; as repreſented on the prime conductor E, fig. 2.

The main of M. Lane's diſcharging electrometer conſiſts in a braſs ball, about one inch and a half in diameter, ſcrewed to a braſs graduated rod, and adapted to a proper frame, ſo that it may be ſet at any required diſtance from the prime conductor, or the knob of an electric jar. The principal uſe of this electrometer is to let a jar diſcharge by itſelf through any proper circuit, without uſing any diſcharging rod, or removing any part of the apparatus; and to give ſhocks nearly of the ſame ſtrength. Suppoſe, for inſtance, that the above-mentioned braſs ball be ſet at half an inch diſtance from the prime conductor, and that a coated jar be ſituated ſo as to touch the prime conductor with its knob, and to have its outſide coating communicating with the abovementioned braſs ball. Now, it is evident, that the circuit, from the outſide to the inſide of the jar, is interrupted only between the prime conductor and the braſs ball, which lie half an inch aſunder: therefore, when the jar is charging, and the charge is become ſo high as to ſtrike through half an inch of air, the jar will diſcharge itſelf; and by keeping the braſs ball at the ſame diſtance from the prime conductor, and charging the jar ſucceſſively, the ſhocks will be of the ſame ſtrength.

This electrometer is, however, ſubject to a great inconvenience; which is, that the ſurface of the braſs ball is often deprived of its ſmoothneſs by the force of the exploſion, in which caſe it becomes unfit for uſe. The principal uſe for which this electrometer is intended, *i. e.* to give ſhocks of the ſame ſtrength, may be more elegantly obtained by the above-deſcribed quadrant electrometer, which ſuffers no damage by the diſcharges; hence a delineation and a more particular deſcription of the diſcharging electrometer is unneceſſary.

46 Mr Henley's univerſal diſcharger.

Fig. 5. repreſents Mr Henly's univerſal diſcharger, which is of a very extenſive uſe, and is compoſed of the following parts. A is a flat board 15 inches long, four inches broad, and one thick, or thereabouts, which forms the baſis of the inſtrument. B B are two glaſs pillars cemented in two holes upon the board A, and furniſhed at their top with braſs caps, each of which has a turning joint, and ſupports a ſpring tube, through which the wire D C ſlides: each of theſe caps is compoſed of three pieces of braſs, connected ſo, that the wire D C, beſides its ſliding through the ſocket, has two other motions, viz. an horizontal and a vertical one. Each of the wires D C, D C, is furniſhed with an open ring at one end, and at the other end has a braſs ball D, which, by a ſhort ſpring ſocket, is ſlipt upon its pointed extremity, and it may be removed from it at pleaſure. E is a ſtrong circular piece of wood five inches in diameter, having, on its ſurface, a ſlip of ivory inlaid, and furniſhed with a ſtrong cylindrical foot, which fits the cavity of the ſocket F, which is faſtened in the middle of the bottom board, and has a ſcrew G, which ſerves to faſten the foot of the circular board E at any required height. H is a ſmall preſs belonging to this inſtrument: it conſiſts of two oblong pieces of board, which may be preſſed againſt each other by means of two ſcrews *a a*: the lower of theſe boards has a cylindrical foot equal to the foot of the circular board E. When this preſs is to be uſed, it is fixed into the ſocket F, in the place of the circular board E, which muſt, in that caſe, be removed.

(c) Theſe threads ſhould be wetted in a weak ſolution of ſalt.

Fig. 11. is an electric jar coated with tinfoil on the inſide and outſide, within three inches of the top of the cylindrical part of the glaſs, having a wire with a round braſs knob A at its extremity. This wire paſſes through the cork D, that ſtops the mouth of the jar, and at its lower end is bended ſo as to touch the inſide coating in ſeveral places. When corks are uſed to ſtop electric jars, they ſhould be made very dry, and dipped in melted bees-wax or varniſhed.

Fig. 10. repreſents a battery compoſed of 16 jars coated in the inſide and outſide with tinfoil, which all together contain about 12 feet of coated glaſs. About the middle of each of theſe jars is a cork that ſuſtains a wire, which at the top is faſtened round or ſoldered to the wire E knobbed at each end, which connects the inſide coatings of four jars; and by the wires F F F the inſide coatings of all the 16 jars are connected together. Each of the wires F has a ring at one end, through which one of the wires E paſſes, and the other end has a braſs knob. If the whole force of the battery is not required, one, two, or three rows of jars may be uſed at pleaſure: for as each of the wires F F F is moveable round the wire E, which paſſes thro' its ring, and reſts upon the next wire E, it may be eaſily removed from that, and turned upon the contrary wire E; and thus the communication between one row of jars and another may be diſcontinued at pleaſure. See the figure.

The ſquare box that contains theſe jars is of wood lined at the bottom with ſheet-lead or tin, and has two handles on two oppoſite ſides, by which it may be eaſily removed. In one ſide of the box is a hole, thro' which an iron hook B paſſes, which communicates with the metallic lining of the box, and conſequently with the outſide coating of all the jars. To this hook is faſtened a wire, the other end of which is connected with the diſcharging rod.

The diſcharging rod conſiſts of a glaſs handle A, and two curved wires B B, which move by a joint C, fixed to the braſs cap of the glaſs handle A. The wires B B are pointed, and the points enter the knobs D D, to which they are ſcrewed, and may be unſcrewed from them at pleaſure. By this conſtruction we have the opportunity of uſing the balls or the points, as occaſion requires; and as the wires are moveable by the joint C, they may be adapted to ſmaller or larger jars at pleaſure.

The battery, repreſented in the plate, is a ſmall one in compariſon to thoſe now frequently uſed, and much too weak for the purpoſe of ſome experiments, hereafter to be deſcribed. But when a large battery is to be conſtructed, it is better to make two, three, or more ſmall ones, as repreſented in the plate, than a ſingle large battery, which is heavy, and, on ſeveral accounts, inconvenient. The force of ſeveral ſmall batteries may be eaſily united by a wire or a chain, and thus they may be made to act in every reſpect like a large one.

F in fig. 2. is a circular braſs plate hung on the prime conductor by a chain, and reſting in an horizontal poſition. Underneath this, there is another plate P parallel and equal to the former (but it would be better if it was a little larger), which is ſupported by a ſtand H of braſs, having alſo a ſocket to receive the foot of the plate, and a ſcrew G to fix it at different diſtances.

D in fig. 2. is a fly made of ſmall braſs wires fixed in a cap of braſs alſo, which is to be put upon the pointed wire K, that is ſcrewed to the prime conductor, upon which it muſt ſtand in equilibrio, like the needle of a compaſs. The other ends *a*, *b*, *c*, *d*, of the wires are pointed and bent all one way.

It is highly requiſite for an electrician to have by him ſeveral inſulating ſtools, or ſtands, they being very neceſſary for ſeveral experiments. The beſt materials to conſtruct theſe are glaſs covered with ſealing-wax, and baked wood (A). A large ſtool, proper to inſulate a chair upon, or two or three perſons ſtanding, may be made with a ſtrong board, about two feet and a half ſquare; and may be ſupported by four feet of glaſs, or baked wood, about eight inches long. But ſmall ſtands are better made with one foot or pillar, and all of baked wood or glaſs, without any conducting ſubſtance in their conſtruction. Drinking-glaſſes, either varniſhed, or in part covered with ſealing wax, anſwer this purpoſe very well.

§ 3. *Practical Rules concerning the Uſe of the electrical Apparatus, and the performing of Experiments.*

1. The firſt thing to be obſerved is, the preſervation and care of the inſtruments. The electrical machine, the coated jars, and in ſhort every part of the electrical apparatus, ſhould be kept clean, and as free as poſſible from duſt and moiſture.

2. When the weather is clear, and the air dry, eſpecially in clear and froſty weather, the electrical machine will always work well. But when the weather is very hot, the electrical machine is not ſo powerful: nor in damp weather, except it be brought into a warm room; and the cylinder, the ſtands, the jars, &c. be made thoroughly dry.

3. Before the machine be uſed, the cylinder ſhould be firſt wiped very clean with a ſoft linen cloth that is dry, clean, and warm; and afterwards with a clean hot flannel, or an old ſilk handkerchief: this done, if the winch be turned when the prime conductor, and other inſtruments are removed from the electrical machine, and the knuckle be held at a little diſtance from the ſurface of the cylinder, it will be ſoon perceived,

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(A) The wood ſhould be baked very well, even till it becomes quite brown, it being then in the beſt ſtate for inſulation; and to make it ſtill better, *i. e.* to defend it from moiſture, it may be ſlightly varniſhed as ſoon as it comes out of the oven, or elſe boiled in linſeed oil; but in this caſe, after boiling, it ſhould be made hot again, and then it is fit for uſe.

Apparatus.

that the electric fluid comes like a wind from the cylinder to the knuckle; and, if the motion be a little continued, ſparks and crackling will ſoon follow. This indicates that the machine is in good order, and the electrician may proceed to perform his experiments. But if, when the winch is turned for ſome time, no wind is felt upon the knuckle, then the fault is, very likely, in the rubber; and to remedy that, uſe the following directions: By looſening the ſcrews on the back of the rubber, remove it from its glaſs pillar, and keep it a little near the fire, ſo that its ſilk part may be dried; take now a dry piece of mutton ſuet, or a little tallow from a candle, and juſt paſs it over the leather of the rubber; then ſpread a ſmall quantity of the above-deſcribed amalgam over it, and force it as much as poſſible into the leather. This done, replace the rubber upon the glaſs pillar; let the glaſs cylinder be wiped once more, and then the machine is fit for uſe.

4. Sometimes the machine will not work well becauſe the rubber is not ſufficiently ſupplied with electric fluid; which happens when the table, upon which the machine ſtands, and to which the chain of the rubber is connected, is very dry, and conſequently in a bad conducting ſtate. Even the floor and the walls of the room are, in very dry weather, bad conductors, and they cannot ſupply the rubber ſufficiently. In this caſe the beſt expedient is, to connect the chain of the rubber, by means of a long wire, with ſome moiſt ground, a piece of water, or with the iron work of a water-pump; by which means the rubber will be ſupplied with as much electric fluid as is required.

5. When a ſufficient quantity of amalgam has been accumulated upon the leather of the rubber, and the machine does not work very well, then, inſtead of putting on more amalgam, it will be ſufficient to take the rubber off, and to ſcrape a little that which is already upon the leather.

6. It will be often obſerved, that the cylinder, after being uſed ſome time, contracts ſome black ſpots, occaſioned by the amalgam, or ſome foulneſs of the rubber, which grow continually larger, and greatly obſtruct its electric power. Theſe ſpots muſt be carefully taken off, and the cylinder muſt be frequently wiped in order to prevent its contracting them.

7. In charging electric jars in general, it muſt be obſerved, that not every machine will charge them equally high. That machine whoſe electric power is the ſtrongeſt, will always charge the jars higheſt. If the coated jars, before they are uſed, be made a little warm, they will receive and hold the charge the better.

8. If ſeveral jars are connected together, among which there is one that is apt to diſcharge itſelf very ſoon, then the other jars will ſoon be diſcharged with that; although they may be capable of holding a very great charge by themſelves. When electric jars are to be diſcharged, the electrician muſt be cautious, leſt, by ſome circumſtance not adverted to, the ſhock ſhould paſs through any part of his body; for an unexpected ſhock, though not very ſtrong, may occaſion ſeveral diſagreeable accidents. In making the diſcharge, care muſt be taken that the diſcharging rod be not placed on the thinneſt part of the glaſs, for that may cauſe the breaking of the jar.

Experiments.

9. When large batteries are diſcharged, jars will be often found broken in it, which burſt at the time of the diſcharge. To remedy this inconvenience, Mr Nairne ſays, he has found a very effectual method, which is, never to diſcharge the battery through a good conductor, except the circuit be at leaſt five feet long. Mr Nairne ſays, that ever ſince he made uſe of this precaution, he has diſcharged a large battery near a hundred times without ever breaking a ſingle jar, whereas before he was continually breaking them. But here it muſt be conſidered, that the length of the circuit weakens the force of the ſhock proportionably; the higheſt degree of which is in many experiments required.

10. It is adviſable, when a jar, and eſpecially a battery, has been diſcharged, not to touch its wires with the hand, before the diſcharging rod be applied to its ſides a ſecond and even a third time; as there generally remains a reſiduum of the charge, which is ſometimes very conſiderable.

11. When any experiment is to be performed, which requires but a ſmall part of the apparatus, the remaining part of it ſhould be placed at a diſtance from the machine, the prime conductor, and even from the table, if that is not very large. Candles, particularly, ſhould be placed at a conſiderable diſtance from the prime conductor, for the effluvia of their flames carry off much of the electric fluid.

SECT. IV. *Entertaining Experiments.*

I. *The electrified cork-ball Electrometer.*

FIX at the end of the prime conductor the knobbed rod I B, fig. 2. and hang on it the electrometer with the cork-balls, fig. 3. The balls will now touch one another, the threads hanging perpendicularly, and parallel to each other. But if the cylinder of the machine be whirled by turning the winch E, then the cork-balls will repel one another; and more or leſs, according as the electricity is more or leſs powerful.—If the electrometer be hung to a prime conductor negatively electrified, *i. e.* connected with the inſulated rubber of the machine, the cork-balls will alſo repel each other. If, in this ſtate of repulſion, the prime conductor is touched with ſome conducting ſubſtance not inſulated, the cork-balls will immediately come together. But if, inſtead of the conducting ſubſtance, the prime conductor is touched with an electric, as for inſtance a ſtick of ſealing-wax, a piece of glaſs, &c. then the cork-balls will continue to repel each other; becauſe the electric fluid cannot be conducted through that electric: hence we have an eaſy method of determining what bodies are conductors, and what electrics. This electrical repulſion is alſo ſhewn by the quadrant electrometer, with a large downy feather, or the like; for if theſe be connected with the prime conductor, and the winch be turned, the electrometer will raiſe its index, and the feather, by the divergency of its down, will appear ſwelled in a beautiful manner.

II. *Attraction and Repulſion of light Bodies.*

CONNECT with the prime conductor the two parallel braſs plates F, P, as repreſented in fig. 2. at about three inches diſtance from one another; and upon the lower plate put any kind of light bodies, as bran, bits of paper, bits of leaf-gold, &c.; then work the machine, and the light bodies will ſoon move between the two plates, leaping alternately from one to the other with great velocity. If, inſtead of bran or irregular pieces of other matter, ſmall figures of men or other things cut in paper and painted, or rather made of the pith of alder, be put upon the plate, they will generally move in an erect poſition, but will ſometimes leap one upon another, or exhibit different poſtures, ſo as to afford a pleaſing ſpectacle to an obſerving company.

III. *The Flying-feather, or Shuttle-cork.*

THE phenomena of electric attraction and repulſion may be repreſented alſo with a glaſs tube, or a charged bottle, and ſome of them in a manner more ſatiſfactory than with the machine.

Take a glaſs tube (whether ſmooth or rough is not material); and after having rubbed it, let a ſmall light feather be let out of your fingers at the diſtance of about eight or nine inches from it. This feather will be immediately attracted by the tube, and will ſtick very cloſe to its ſurface for about two or three ſeconds, and ſometimes longer; after which time it will be repelled; and if the tube be kept under it, the feather will continue floating in the air at a conſiderable diſtance from the tube, without coming near it again, except it firſt touches ſome conducting ſubſtance; and if you manage the tube dexterouſly, you may drive the feather through the air of a room at pleaſure.

There is a remarkable circumſtance attending this experiment; which is, that if the feather be kept at a diſtance from the tube by the force of electric repulſion, it always preſents the ſame part towards the tube:—You may move the excited tube about the feather very ſwiftly, and yet the ſame ſide of the feather will always be preſented to the tube.

This experiment may be agreeably varied in the following manner: A perſon may hold in his hand an excited tube of ſmooth glaſs, and another perſon may hold an excited rough glaſs tube, a ſtick of ſealing-wax, or in ſhort another electric negatively electrified, at about one foot and a half diſtance from the ſmooth glaſs tube: a feather now may be let go between theſe two differently excited-electrics, and it will leap alternately from one electric to the other; and the two perſons will ſeem to drive a ſhuttle-cork from one to the other, by the force of electricity.

IV. *The electric Well.*

PLACE upon an electric ſtool a metal quart-mug, or ſome other conducting body nearly of the ſame form and dimenſion; then tie a ſhort cork-ball electrometer, of the kind repreſented fig. 3. at the end of a ſilk thread proceeding from the cieling of the room, or from any other ſupport, ſo that the electrometer may be ſuſpended within the mug, and no part of it may be above the mouth: this done, electrify the mug by giving it a ſpark with an excited electric or otherwiſe; and you will ſee that the electrometer, whilſt it remains in that inſulated ſituation, even if it be made to touch the ſides of the mug, is not attracted by it, nor does it acquire any electricity; but if, whilſt it ſtands ſuſpended within the mug, a conductor, ſtanding out of the mug, be made to communicate with, or only preſented to it, then the electrometer is immediately attracted by the mug.

THE following experiments require to be made in the dark: for although the electric light in ſeveral circumſtances may be ſeen in the day-light, yet its appearance in this manner is very confuſed; and that the electrician may form a better idea of its different appearances, it is abſolutely neceſſary to perform ſuch experiments in a darkened room.

V. *The Star and Pencil of electric Light.*

WHEN the electrical machine is in good order, and the prime conductor is ſituated with the collector ſufficiently near the glaſs cylinder, turn the winch, and you will ſee a lucid ſtar at each of the points of the collector. This ſtar is the conſtant appearance of the electric fluid that is entering a point. At the ſame time you will ſee a ſtrong light proceeding from the rubber, and ſpreading itſelf over the ſurface of the cylinder; and if the excitation of the cylinder is very powerful, denſe ſtreams of fire will proceed from the rubber, and, darting round almoſt half the circumference of the cylinder, will reach the points of the collector. If the prime conductor is removed, the denſe ſtreams of fire will go quite round the cylinder; reaching from one ſide of the rubber to the other. If the chain of the rubber is taken off, and a pointed body, as for inſtance the point of a needle or a pin, is preſented to the back of the rubber, at the diſtance of about two inches, a lucid pencil of rays will appear to proceed from the point preſented, and diverge towards the rubber. If another pointed body be preſented to the prime conductor, it will appear illuminated with a ſtar; but if a pointed wire or other pointed conducting body be connected with the prime conductor, it will throw out a pencil of rays.

VI. *Drawing Sparks.*

LET the prime conductor be ſituated in its proper place, and electrify it by working the machine; then bring a metallic rod with a round knob at each end, or the knuckle of a finger, within a proper diſtance of the prime conductor, and a ſpark will be ſeen between that and the knuckle or knobbed wire. The longer and ſtronger ſpark is drawn from that end of the prime conductor, which is fartheſt from the cylinder, or rather from the end of the knobbed rod I B, fixed at its end B, fig. 2.; for the electric fluid ſeems to acquire an impetus by going through a long conductor, when electrified by a powerful machine.—This ſpark (which has the ſame appearance whether drawn from a prime conductor poſitively, or negatively electrified) appears like a long line of fire, reaching from the conductor to the oppoſed body, and often (particularly when the ſpark is long, and different conducting ſubſtances are near the line of its direction) it will have the appearance of being bended to ſharp angles in different places, exactly reſembling a flaſh of lightning. It often darts bruſhes of light ſidewiſe in every direction.

VI. *The electric Light flaſhing between two metallic Plates.*

LET two perſons, one ſtanding upon an inſulated ſtool, and communicating with the prime conductor, and another ſtanding upon the floor, each hold in one of his hands a metal plate, in ſuch a manner, that the plates may ſtand back to back in a parallel ſituation, and about two inches aſunder. Let the winch of the machine be turned, and you will ſee the flaſhes of light between the two plates ſo denſe and frequent, that you may eaſily diſtinguiſh any thing in the room. By this experiment the electric light is exhibited in a very copious and beautiful manner, and it bears a ſtriking reſemblance to lightning.

VIII. *To fire inflammable Spirits.*

The power of the electric ſpark to ſet fire to inflammable ſpirits, may be exhibited by ſeveral different methods, but more eaſily thus: Hang to the prime conductor a ſhort rod having a ſmall knob at its end; then pour ſome ſpirits of wine, a little warmed, into a ſpoon of metal; hold the ſpoon by the handle, and place it in ſuch a manner, that the ſmall knob on the rod may be about one inch above the ſurface of the ſpirits. In this ſituation, if, by turning the winch, a ſpark be made to come from the knob, it will ſet the ſpirits on fire.

This experiment may be varied different ways, and may be rendered very agreeable to a company of ſpectators. A perſon, for inſtance, ſtanding upon an electric ſtool, and communicating with the prime conductor, may hold the ſpoon with the ſpirits in his hand, and another perſon, ſtanding upon the floor, may ſet the ſpirits on fire by bringing his finger within a ſmall diſtance of it. Inſtead of his finger, he may fire the ſpirits with a piece of ice, when the experiment will ſeem much more ſurpriſing. If the ſpoon is held by the perſon ſtanding upon the floor, and the inſulated perſon brings ſome conducting ſubſtance over the ſurface of the ſpirits, the experiment ſucceeds as well.

IX. *The artificial Bolognian Stone illuminated by the electric Light.*

The moſt curious experiment to ſhew the penetrability of the electric light, is made with the real, or more eaſily with the artificial, Bolognian ſtone, invented by the late Mr J. Canton. This phoſphorus is a calcareous ſubſtance, generally uſed in the form of a powder, which has the property of abſorbing light when expoſed to it, and afterwards to appear lucid when brought into the dark *.—Take ſome of this powder, and, by means of ſpirits of wine or ether, ſtick it all over the inſide of a clear glaſs phial, and ſtop it with a glaſs ſtopper, or a cork and ſealing-wax. If this phial be kept in a darkened room (which for this experiment muſt be very dark), it will give no light; but let two or three ſtrong ſparks be drawn from the prime conductor, when the phial is kept at about two inches diſtance from the ſparks, ſo that it may be expoſed to that light, and this phial will receive that light, and afterwards will appear illuminated for a conſiderable time.—The powder may be ſtuck upon a board by means of the white of an egg, ſo as to repreſent figures of planets, letters, or any thing elſe at the pleaſure of the operator; and theſe figures may be illuminated in the dark, in the ſame manner as the above-deſcribed phial.

A beautiful method to expreſs geometrical figures with the above phoſphorus, is to bend ſmall glaſs tubes of about the tenth part of an inch diameter, in the ſhape and figure deſired, and then fill them with the phoſphorus powder. Theſe may be illuminated in the manner deſcribed, and they are not ſo ſubject to be ſpoiled, as the figures repreſented upon the board frequently are.—The beſt method of illuminating this phoſphorus, and which Mr W. Canton generally uſed, is to diſcharge a ſmall electric jar near it.

X. *The luminous Conductor.*

Fig. 6. Plate XCIX. repreſents a prime conductor invented by Mr Henly, which ſhews clearly the direction of the electric fluid paſſing through it, from whence it is called the *luminous conductor*. The middle part E F of this conductor is a glaſs tube about 18 inches long and three or four inches in diameter. To both ends of this tube the hollow braſs pieces F D, B E, are cemented air-tight, one of which has a point C, by which it receives the electric fluid, when ſet near the excited cylinder of the electrical machine, and the other has a knobbed wire G, from which a ſtrong ſpark may be drawn; and from each of the pieces F D, B E, a knobbed wire proceeds within the cavity of the glaſs tube. The braſs piece F D, or B E, is compoſed of two parts; *i. e.* a cap F cemented to the glaſs tube, and having a hole with a valve, by which the cavity of the glaſs tube is exhauſted of air; and the ball D, which is ſcrewed upon the cap F. The ſupporters of this inſtrument are two glaſs pillars faſtened in the bottom-board H, like the prime conductor repreſented fig. 2. When the glaſs tube of this conductor is exhauſted of air by means of an air-pump, and the braſs ball is ſcrewed on, as repreſented in the figure, then it is fit for uſe, and may ſerve for a prime conductor to an electrical machine. If the point C of this conductor is ſet near the excited cylinder of the machine, it will appear illuminated with a ſtar; at the ſame time the glaſs tube will appear all illuminated with a weak light; but from the knobbed wire that proceeds within the glaſs from the piece F D, a lucid pencil will iſſue out, and the oppoſite knob will appear illuminated with a ſtar, which, as well as the pencil of rays, is very clear, and diſcernible among the other light that occupies the greateſt part of the cavity of the tube. If the point C, inſtead of being preſented to the cylinder, be connected with the rubber of the machine, the appearance of light within the tube will be reverſed; the knob which communicates with the piece F D appearing illuminated with a ſtar, and the oppoſite with a pencil of rays; becauſe in this caſe the direction of the electric fluid is juſt the contrary of what it was before; it then going from D to B, and now coming from B and going to D.—If the wires within the tube E F, inſtead of being furniſhed with knobs, be pointed, the appearance of light is the ſame; but it ſeems not ſo ſtrong in this, as in the other caſe.

XI. *The conducting Glaſs Tube.*

Take a glaſs tube of about two inches diameter, and about two feet long; fix to one of its ends a braſs cap, and to the other a ſtop-cock or a valve; then, by means of an air-pump, exhauſt it of air. If this tube be held by one end, and its other end be brought near the electrified prime conductor, it will appear to be full of light whenever a ſpark is taken by it from the prime conductor, and much more ſo if an electric jar be diſcharged through it.—This experiment may alſo be made with the receiver of an air-pump: take, for inſtance, a tall receiver, clean and dry; and through a hole at its top inſert a wire, which muſt be cemented air-tight. The end of the wire that is within the tube, muſt be pointed, but not very ſharp; and the other end muſt be furniſhed with a knob. Put this receiver upon the plate of the air-pump, and exhauſt it. If now the knob of the wire at the top of the receiver be touched with the prime conductor, every ſpark will paſs through the receiver in a denſe and large body of light, from the wire, to the plate of the air-pump. When any thing is to be touched with the prime conductor that is not very portable, as the air-pump above-mentioned, the communication between the former and the latter may be made by means of a rod furniſhed with an electric handle, or the like.

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* See *Chemiſtry*, nº 484.

XII. *The Aurora Borealis.*

TAKE a phial nearly of the ſhape and ſize of a Florence flaſk; fix a ſtop-cock or a valve to its neck, and exhauſt it of air as much as poſſible with a good air-pump. If this glaſs is rubbed in the common manner uſed to excite electrics, it will appear luminous within, being full of a flaſhing light, which plainly reſembles the aurora borealis or northern light. This phial may alſo be made luminous, by holding it by either end, and bringing the other end to the prime conductor; in this caſe, all the cavity of the glaſs will inſtantly appear full of flaſhing light, which remains in it for a conſiderable time after it has been removed from the prime conductor.—Inſtead of the above-deſcribed glaſs veſſel, a glaſs tube, exhauſted of air and hermetically ſealed, may be uſed, and perhaps with better advantage. The moſt remarkable circumſtance of this experiment is, that if the phial, or tube, after it has been removed from the prime conductor (and even ſeveral hours after its flaſhing light hath ceaſed to appear), be graſped with the hand, ſtrong flaſhes of light will immediately appear within the glaſs, which often reach from one of its ends to the other.

XIII. *The viſible electric Atmoſphere.*

G I, fig. 1. Plate C. repreſents the receiver with the plate of an air-pump. In the middle of the plate I F, a ſhort rod is fixed, having at its top a metal ball B nicely poliſhed, whoſe diameter is nearly two inches. From the top of the receiver, another rod A D, with a like ball A, proeeeds, and is cemented air-tight in the neck C; the diſtance of the balls from one another being about four inches, or rather more. If, when the receiver is exhauſted of air, the ball A be electrified poſitively, by touching the top D of the rod A D with the prime conductor, or an excited glaſs tube, a lucid atmoſphere appears about it, which although it conſiſts of a feeble light, is yet very conſpicuous, and very well defined; at the ſame time, the ball B has not the leaſt light. This atmoſphere does not exiſt all round the ball A; but reaches from about the middle of it, to a ſmall diſtance beyond that ſide of its ſurface which is towards the oppoſite ball B. If the rod with the ball A be electrified negatively, then a lucid atmoſphere, like the above deſcribed, will appear upon the ball B, reaching from its middle to a ſmall diſtance beyond that ſide of it that is towards the ball A; at the ſame time, the negatively electrified ball A remains without any light.—The operator in this experiment muſt be careful not to electrify the ball A too much; for then the electric fluid will paſs in a ſpark from one ball to the other, and the experiment will not have the deſired effect. A little practice, however, will render the operation very eaſy and familiar.

XIV. *Of charging and diſcharging a Phial in general.*

TAKE a coated jar, as D E, fig. 2. Plate XCIX. and place it upon the table near the prime conductor, ſo that the knob of its wire, and that only, may be in contact with it: fix the quadrant electrometer E, fig. 2. upon the prime conductor, and then turn the winch of the machine. You will obſerve, that as the jar is charging, the index of the electrometer will riſe gradually as far as 90°, or thereabouts, and then reſt: when this happens, you may conclude that the jar has received its full charge. If now you take a diſcharging rod, and holding it by the glaſs handle, apply firſt one of its knobs to the outſide coating of the jar, and then bring the other knob near the knob of the wire of the jar, or near the prime conductor that communicates with it, you will hear a report, and ſee very vivid ſparks between the diſcharging rod, and the conducting ſubſtances, communicating with the ſides of the jar. This operation diſcharges the jar. If, inſtead of uſing the diſcharging rod, you touch the outſide of the jar with one hand, and bring the other hand near the wire of the jar, the ſame ſpark and report will follow; but now you will feel a ſhock which affects your wriſts, elbows, and, if ſtrong, your breaſt alſo. If a number of perſons join hands, and the firſt of them touches the outſide of the jar, and the laſt touches the wire communicating with the inſide, they will all feel the ſhock, and preciſely at the ſame perceivable time. This ſhock, bearing no reſemblance to any ſenſation otherwiſe felt, cannot conſequently be deſcribed; and in order that a perſon may form a juſt idea of it, he muſt abſolutely feel it.—A ſhock may be given to any ſingle part of the body, if that part only be brought into the circuit.

XV. *The Leyden Vacuum.*

Fig. 8. and 9. of Plate XCIX. repreſent a ſmall phial coated on the outſide, about three inches up the ſides, with tin-foil; at the top of the neck of this phial, a braſs cap is cemented, having a hole with a valve, and from the cap a wire proceeds a few inches within the phial, terminating in a blunt point. When this phial is exhauſted of air, a braſs ball is ſcrewed upon the braſs cap, which is cemented into its neck, ſo as to defend the valve, and prevent any air from getting into the exhauſted glaſs. This phial exhibits clearly the direction of the electric fluid, both in charging and diſcharging; for if it be held by its bottom, and its braſs knob be preſented to the prime conductor poſitively electrified, you will ſee that the electric fluid cauſeth the pencil of rays to proceed from the wire within the phial, as repreſented fig. 9.; and if it is diſcharged, a ſtar will appear in the place of the pencil, as repreſented in fig. 8. But if the phial is held by the braſs cap, and its bottom be touched with the prime conductor, then the point of the wire on its inſide will appear illuminated with a ſtar when charging, and with a pencil when diſcharging. If it be preſented to a prime conductor electrified negatively, all theſe appearances, both in charging and diſcharging, will be reverſed.

XVI. *To pierce a Card and other Subſtances with the electric Exploſion.*

TAKE a card, a quire of paper, or the cover of a book, and keep it cloſe to the outſide coating of a charged jar; put one knob of the diſcharging rod upon the card, quire of paper, &c. ſo that between the knob and coating of the jar, the thickneſs of that card, or quire of paper, only is interpoſed; laſtly, by bringing the other knob of the diſcharging rod near the knob of the jar, make the diſcharge, and the electric matter will pierce a hole (or perhaps ſeveral) quite through the card, or quire of paper. This hole has a bur raiſed on each ſide, except the card, &c. be preſſed hard between the diſcharging rod and the jar; which ſhows that the hole is not made in the direction of the paſſage of the fluid, but in every direction from the centre of the reſiſting body.—If this experiment be made with two cards inſtead of one, which however muſt be kept very little diſtant from one another, each of the cards, after the exploſion, will be found pierced with one or more holes, and each hole will have burs on both ſurfaces of each card. The hole, or holes, are larger or ſmaller, according as the card, &c. is more damp or more dry. It is remarkable, that if the noſtrils are preſented to it, they will be affected with a ſulphureous, or rather a phoſphoreal, ſmell, juſt like that produced by an excited electric.

If, inſtead of paper, a very thin plate of glaſs, roſin, ſealing-wax, or the like, be interpoſed between the knob of the diſcharging rod and the outſide coating of the jar, on making the diſcharge, this will be broken in ſeveral pieces. Small inſects may alſo be killed in this manner. They may be held between the outſide coating of the jar, and the knob of the diſcharging rod, like the above card; and a ſhock of a common phial ſent through them, will inſtantly deprive them of life, if they are pretty ſmall: but if larger, they will be affected in ſuch a manner, as to appear quite dead on firſt receiving the ſtroke; but will, after ſome time, recover: this, however, depends on the quantity of the charge ſent through them.

XVII. *To ſhew the Effect of the Shock ſent over the Surface of a Card or other Subſtances.*

PUT the extremities of two wires upon the ſurface of a card, or other body of an electric nature, ſo that they may be in one direction, and about one inch diſtance from one another; then, by connecting one of the wires with the outſide of a charged jar, and the other wire with the knob of the jar, the ſhock will be made to paſs over the card or other body.—If the card be made very dry, the lucid track between the wires will be viſible upon the card for a conſiderable time after the exploſion. If a piece of common writing paper be uſed inſtead of the card, it will be torn by the exploſion into very ſmall bits.

If, inſtead of the card, the exploſion is ſent over the ſurface of a piece of glaſs, this will be marked with an indelible track, which generally reaches from the extremity of one of the wires to the extremity of the other. In this manner, the piece of glaſs is very ſeldom broken by the exploſion. But Mr Henly has diſcovered a very remarkable method to increaſe the effect of the exploſion upon the glaſs; which is by preſſing with weights that part of the glaſs which lies between the two wires, (*i. e.* that part over which the ſhock is to paſs). He puts firſt a thick piece of ivory upon the glaſs, and places upon that ivory a weight at pleaſure, from one quarter of an ounce to ſix pounds: The glaſs in this manner is generally broken by the exploſion into innumerable fragments, and ſome of it is abſolutely reduced into an impalpable powder. If the glaſs is very thick, and reſiſts the force of the exploſion, ſo as not to be broken by it, it will be found marked with the moſt lively priſmatic colours, which are thought to be occaſioned by very thin laminæ of the glaſs, in part ſeparated from it by the ſhock. The weight laid upon the glaſs is always ſhook by the exploſion, and ſometimes it is thrown quite off from the ivory. This experiment may be moſt conveniently made with the univerſal diſcharger, fig. 5. of Plate XCIX.

XVIII. *To ſwell Clay, and break ſmall Tubes, by the electric Exploſion.*

ROLL up a piece of ſoft tobacco-pipe clay in a ſmall cylinder C D, fig. 2. Plate C. and inſert in it two wires A, B, ſo that their ends without the clay may be about a fifth part of an inch from one another. If a ſhock be ſent through this clay, by connecting one of the wires A or B with the outſide of a charged jar, and the other with the inſide, it will be inflated by the ſhock, *i. e.* by the ſpark, that paſſes between the two wires, and, after the exploſion, will appear as repreſented fig. 3. If the ſhock ſent through it is too ſtrong, and the clay not very moiſt, it will be broken by the exploſion, and its fragments ſcattered in every direction. To make this experiment with a little variation, take a piece of the tube of a tobacco-pipe, about one inch long, and fill its bore with moiſt clay; then inſert in it two wires, as in the above rolled clay; and ſend a ſhock through it. This tube will not fail to burſt by the force of the exploſion, and its fragments will be ſcattered about to a great diſtance. If, inſtead of clay, the above-mentioned tube of the tobacco-pipe, or a glaſs tube (which will anſwer as well), be filled with any other ſubſtance, either electric or non-electric, inferior to metal, on making the diſcharge, it will be broken in pieces with nearly the ſame force. This experiment is the invention of Mr Lane, F. R. S.

XIX. *To make the electric Spark viſible in Water.*

FILL a glaſs tube of about half an inch diameter, and ſix inches long, with water; and to each extremity of the tube adapt a cork, which may confine the water; through each cork inſert a blunt wire, ſo that the extremities of the wires within the tube may be very near one another; laſtly, connect one of theſe wires with the coating of a ſmall charged phial, and touch the other wire with the knob of it; by which means the ſhock will paſs through the wires, and cauſe a vivid ſpark to appear between their extremities within the tube. In performing this experiment, care muſt be taken that the charge be exceedingly weak, otherwiſe the tube will burſt. C in fig. 4. Plate C. reprepreſents a common drinking glaſs almoſt full of water. A B are two knobbed wires, ſo bent, that their knobs may be within a little diſtance of one another in the water. If one of theſe wires be connected with the outſide coating of a pretty large jar, and the other wire be touched with the knob of it; the exploſion which muſt paſs through the water from the knob of one of the wires to that of the other, will diſperſe the water, and break the glaſs with a ſurpriſing violence. This experiment is very dangerous if not conducted with great caution.

XX. *To fire Gun-powder.*

Make a ſmall cartridge of paper, and fill it with gun-powder, or elſe fill the tube of a quill with it; inſert two wires, one at each extremity, ſo that their ends within the quill, or cartridge, may be about one fifth of an inch from one another: this done, ſend the charge of a phial through the wires; and the ſpark between their extremities, that are within the cartridge, or quill, will ſet fire to the gun-powder. If the gun-powder be mixed with ſteel-filings, it will take fire more readily, and with a very ſmall ſhock.

XXI. *To ſtrike Metals into Glaſs.*

Take two ſlips of common window-glaſs about three inches long, and half an inch wide; put a ſmall ſlip of gold, ſilver, or braſs leaf, between them, and tie them together, or elſe preſs them together between the boards of the preſs H, belonging to the univerſal diſcharger fig. 5. Plate XCIX. leaving a little of the metallic leaf out between the glaſſes at each end; then ſend a ſhock through this metallic leaf, and the force of the exploſion will drive part of the metal into ſo cloſe a contact with the glaſs, that it cannot be wiped off, or even be affected by the common menſtrua which otherwiſe would diſſolve it. In this experiment the glaſſes are often ſhattered to pieces; but whether they are broken or not, the indelible metallic tinge will always be found in ſeveral places, and ſometimes thro' the whole length of both glaſſes.

XXII. *To ſtain Paper or Glaſs.*

Lay a chain, which forms a part of the circuit between the two ſides of a charged jar, upon a ſheet of white paper; and if a ſhock be ſent through it, the paper will be found ſtained with a blackiſh tinge at the very juncture of the links. If the charge be very large, the paper, inſtead of being ſtained with ſpots, is burnt through. If the chain be laid upon a pane of glaſs inſtead of paper, the glaſs will often be found ſtained with ſpots in ſeveral places, but (as might be expected) not ſo deep as the paper. If this experiment be made in the dark, a ſpark will be ſeen at every juncture of the links; and if the links are ſmall, and the ſhock pretty ſtrong, the chain will appear illuminated like a line of fire.

XXIII. *The lateral Exploſion.*

If a jar be diſcharged with a diſcharging rod that has no electric handle, the hand that holds it, in making the diſcharge, feels ſome kind of ſhock, eſpecially when the charge is conſiderable. In other words: A perſon, or any conducting ſubſtance, that is connected with one ſide of a jar, but forms no part of the circuit, will feel a kind of ſhock, *i. e.* ſome effect of the diſcharge. This may be rendered viſible in the following manner. Connect with the outſide of a charged jar a piece of chain; then diſcharge the jar thro' another circuit, as for inſtance with a diſcharging rod in the common way, and the chain that communicates with the outſide of the jar, and which makes no part of the circuit, will appear lucid in the dark, *i. e.* ſparks will appear between the links; which ſhows, that the electric fluid, natural to that chain, muſt by ſome means have been diſturbed. This chain will alſo appear luminous, if it is not in contact with the outſide of the jar, but only very near it; and on making the diſcharge, a ſpark will be ſeen between the jar, and the end of the chain near it. This electrical appearance out of the circuit of a diſcharging jar, is that which we call the *lateral exploſion;* and to make it appear in the moſt conſpicuous manner, obſerve the following method, which is of that Dr Prieſtley.

When a jar is charged, and ſtands upon the table as uſual, inſulate a thick metallic rod, and place it ſo that one of its ends may be contiguous to the outſide coating of the jar; and within about half an inch of its other end, place a body of about ſix or ſeven feet in length, and a few inches in breadth: then put a chain upon the table, ſo that one of its ends may be about an inch and a half diſtant from the coating of the jar: at the other end of the chain apply one knob of the diſcharging rod, and bring the other knob to the wire of the jar, in order to make the exploſion. On making the diſcharge in this manner, a ſtrong ſpark will be ſeen between the inſulated rod, which communicates with the coating of the jar, and the body near its extremity, which ſpark does not alter the ſtate of that body in reſpect to electricity. Whether this lateral exploſion is received on flat and ſmooth ſurfaces, or upon ſharp points, the ſpark is always equally long and vivid.

XXIV. *To diſcharge a Jar ſilently.*

When a large jar is fully charged, which would give a terrible ſhock, put one of your hands in contact with its outſide coating; with the other hold a ſharp pointed needle, and keeping the point directed towards the knob of the jar, proceed gradually near it, until the point of the needle touches the knob. This operation diſcharges the jar entirely; and you will either receive no ſhock at all, or ſo ſmall a one as can hardly be perceived. The point of the needle, therefore, has ſilently and gradually drawn all the ſuperfluous fluid from the inſide ſurface of the electric jar.

XXV. *Drawing the Electricity from the prime Conductor by a Point.*

Let a perſon hold the knob of a braſs rod at ſuch a diſtance from the prime conductor, that ſparks may eaſily fly from the latter to the former, when the machine is in motion. Then let the winch be turned; and while the ſparks are following one another, preſent the ſharp point of a needle at nearly twice the diſtance from the prime conductor, that the knobbed rod is held; and you will obſerve that no more ſparks will go to the rod:—remove the needle entirely, and the ſparks will be ſeen again;—preſent the needle, and the ſparks diſappear: which evidently ſhows, that the point of the needle draws off ſilently almoſt all the fluid that the cylinder throws upon the prime conductor.

If the needle be fixed upon the prime conductor with the point outward, and the knob of a diſcharging rod, or the knuckle of a finger, be brought very near the prime conductor, though the excitation of the cylinder may be very ſtrong, yet you will perceive that no ſpark, or an exceeding ſmall one, can be obtained from the prime conductor.

XXVI. *The electric Fly.*

Fix the fly formerly deſcribed upon the prime conductor, as repreſented by D, fig. 2. of Plate XCIX. then turn the winch of the machine, and the fly will immediately begin to move round, in an horizontal poſition, and in the direction of the letters *adcb*, *i. e.* contrary to the direction of the points of the wires. If the experiment is repeated with a conductor negatively electrified, the fly will turn the ſame way as before, *viz.* in the direction of the letters *adcb*. The above fly does not move *in vacuo;* and even if placed under a cloſe receiver, it will turn but for a little while, and then ſtop; for the quantity of air contained in the receiver may become readily and equally electrified. If, when the fly under the cloſe receiver is ſtopped, you put the end of your finger on the outſide of the glaſs, oppoſite to one of the points of the fly, this will move again briſkly: and by altering the poſition of your finger occaſionally round the glaſs, you may continue its action a conſiderable time, *viz.* till moſt of that part of the glaſs is charged.

XXVII. *The electrified Cotton.*

Take a ſmall lock of cotton, extended in every direction as much as conveniently can be done; and by a linen thread about five or ſix inches long, or by a thread drawn out of the ſame cotton, tie it to the end of the prime conductor: then let the winch of the machine be turned, and the lock of cotton, on being electrified, will immediately ſwell, by repelling its filaments from one another, and will ſtretch itſelf towards the neareſt conductor. In this ſituation let the winch be kept turning, and preſent the end of your finger, or the knob of a wire, towards the lock of cotton, which will then immediately move towards the finger, and endeavour to touch it; but take with the other hand a pointed needle, and preſent its point towards the cotton, a little above the end of the finger, and you will obſerve the cotton immediately to ſhrink upward, and move towards the prime conductor.—Remove the needle, and the cotton will come again towards the finger.—Preſent the needle, and the cotton will ſhrink again.

XXVIII. *The electrified Bladder.*

Take a large bladder well blown, and cover it with gold, ſilver, or braſs leaf, ſticking it with gum-water: ſuſpend this bladder at the end of a ſilk thread, at leaſt ſix or ſeven feet long, hanging from the ceiling of the room; and electrify the bladder, by giving it a ſtrong ſpark with the knob of a charged bottle: this done, take a knobed wire, and preſent it to the bladder when motionleſs; and you will perceive, that as the knob approaches the bladder, the bladder alſo moves towards the knob, and, when nearly touching it, gives it the ſpark, which it received from the charged phial, and thus it becomes unelectrified. Give it another ſpark, and, inſtead of the knobed wire, preſent the point of a needle towards it, and you will perceive that the bladder will not be attracted by, but rather recede from, the point, eſpecially if the needle be very ſuddenly preſented towards it.

XXXI. *The electrified Capillary Syphon.*

Let a ſmall bucket of metal, full of water, be ſuſpended from the prime conductor; and put in it a glaſs ſyphon of ſo narrow extremity, as that the water will juſt drop from it. If, in this diſpoſition of the apparatus, the winch of the machine be turned, the water, which, when not electrified, only dropt from the extremity of the ſyphon, will now run in a full ſtream, which will even be ſubdivided into ſmaller ſtreams; and if the experiment be made in the dark, it will appear beautifully illuminated.

XXX. *The electrified Bells.*

Figure 5. of Plate C. repreſents an inſtrument having three bells, which are cauſed to ring by the power of electric attraction and repulſion. B is a braſs piece furniſhed with a hook, by which it may be ſuſpended from the rod proceeding from the extremity of the prime conductor A. The braſs bells C and E, are ſuſpended by braſs chains; but the middle bell D, and the two ſmall braſs clappers between C D and D E, are ſuſpended by ſilk threads. From the concave part of the bell D a braſs chain proceeds, which falls upon the table, and has a ſilk thread F at its extremity. The apparatus being diſpoſed as in the figure, if the cylinder of the machine be turned, the clappers will fly from bell to bell with a very quick motion, and the bells will ring as long as they are kept electrified.

The two bells C and E, being ſuſpended by braſs chains, are firſt electrified: hence they attract the clappers, communicate to them a little electricity, and repel them to the unelectrified bell D; upon which the clappers depoſit their electricity, and then run again to the bells C, E, from which they acquire more electricity, &c. If, by holding the ſilk thread F, the chain of the middle bell be raiſed from the table, the bells, after ringing a little while, will ſtop; becauſe bell D, remaining inſulated, will ſoon become as ſtrongly electrified as either of the two other bells; in which caſe the clappers, having no opportunity to depoſite the electricity that they acquire from the bells C, E, muſt conſequently ſtop.

If this experiment be made in the dark, ſparks will be ſeen between the clappers and the bells.

XXXI. *The Spider ſeemingly animated by Electricity.*

Fig. 6. of Plate C. repreſents an electric jar, having a wire C D E faſtened on its outſide, which is bended ſo as to have its knob E as high as the knob A. B is a ſpider made of cork, with a few ſhort threads run through it to repreſent its legs. This ſpider is faſtened at the end of a ſilk thread, proceeding from the ceiling of the room, or from any other ſupport, ſo that the ſpider may hang mid-way between the two knobs A, E, when the jar is not charged. Let the place of the jar upon the table be marked; then charge the jar, by bringing its knob A in contact with the prime conductor, and replace it in its marked place. The ſpider will now begin to move from knob to knob, and continue this motion for a conſiderable time, ſometimes for ſeveral hours.

The inſide of the jar being charged poſitively, the ſpider is attracted by the knob A, which communicates to it a ſmall quantity of electricity; the ſpider then becoming poſſeſſed of the ſame electricity with the knob A, is repelled by it, and runs to the knob E, where it diſcharges its electricity, and is then attracted by the knob A, and ſo on. In this manner the jar is gradually diſcharged; and when the diſcharge is nearly compleated, the ſpider finiſhes its motion.

XXXII. *The Spiral Tube.*

Fig. 7. of Plate C. repreſents an inſtrument compoſed of two glaſs tubes CD, one within another, and cloſed with two knobbed braſs caps A and B. The innermoſt of theſe tubes has a ſpiral row of ſmall round pieces of tin-foil ſtuck upon its outſide ſurface, and lying at about one thirtieth of an inch from each other. If this inſtrument be held by one of its extremities, and its other extremity be preſented to the prime conductor, every ſpark that it receives from the prime conductor will cauſe ſmall ſparks to appear between all the round pieces of tin-foil ſtuck upon the innermoſt tube; which in the dark affords a pleaſing ſpectacle, the inſtrument appearing encompaſſed by a ſpiral line of fire.

The ſmall round pieces of tin-foil are ſometimes ſtuck upon a flat of glaſs A B C D, fig. 8. ſo as to repreſent curve lines, flowers, letters, &c.; and they are illuminated after the ſame manner as the ſpiral tube, *i. e.* by holding the extremity C or B in the hand, and preſenting the other extremity to the prime conductor, when the machine is in motion.

XXXIII. *The Dancing Balls.*

Fix a pointed wire upon the prime conductor, with the point outward; then take a glaſs tumbler, graſp it with your hands, and preſent its inſide ſurface to the point of the wire upon the prime conductor, while the machine is in motion: the glaſs in this manner will ſoon become charged; for its inſide ſurface acquires the electricity from the point, and the hands ſerve as a coating for the outſide. This done, put a few pith balls upon the table, and cover them with this charged glaſs tumbler. The balls will immediately begin to leap up along the ſides of the glaſs, as repreſented fig. 9. Plate C. and will continue their motion for a conſiderable time.

XXXIV. *The Electrical Jack.*

This is an invention of Dr Franklin's, and turns with conſiderable force, ſo that it may ſometimes be uſed for the purpoſes of a common jack. A ſmall upright ſhaft of wood paſſes at right angles through a thin round board of about 12 inches diameter, and turns on a ſharp point of iron fixed in the lower end, while a ſtrong wire in the upper end, paſſing through a ſmall hole in a thin braſs plate, keeps the ſhaft truly vertical. About 30 radii, of equal length, made of ſaſh-glaſs cut into narrow ſlips, iſſue horizontally from the circumference of the board, the ends moſt diſtant from the centre being about four inches apart. On the end of every one a braſs thimble is fixed. If now the wire of a bottle electrified in the common way be brought near the circumference of this wheel, it will attract the neareſt thimble, and ſo put the wheel in motion. That thimble, in paſſing by, receives a ſpark; and thereby being electrified, is repelled, and ſo driven forwards; while a ſecond, being attracted, approaches the wire, receives a ſpark, and is driven after the firſt; and ſo on, till the wheel has gone once round; when the thimbles before electrified approaching the wire, inſtead of being attracted, as they were at firſt, are repelled, and the motion preſently ceaſes. But if another bottle which had been charged thro' the coating, or otherwiſe negatively electrified, is placed near the ſame wheel, its wire will attract the thimble repelled by the firſt, and thereby double the force that carries the wheel round. The wheel therefore moves very ſwiftly, turning round 12 or 15 times in a minute, and with ſuch force, that a large fowl ſpitted on the upper ſhaft may be roaſted by means of it.

XXXV. *The Self-moving Wheel.*

This appears more ſurpriſing than the former, tho' conſtructed upon the ſame principles. It is made of a thin round plate of window-glaſs 17 inches in diameter, well gilt on both ſides, all but two inches next the edge. Two ſmall hemiſpheres of wood are then fixed with cement to the middle of the upper and under ſides, centrally oppoſite; and in each of them a ſtrong thick wire eight or ten inches long, which together make the axis of the wheel. It turns horizontally on a point at the lower end of its axis, which reſts on a bit of braſs cemented within a glaſs ſalt-celler. The upper end of its axis paſſes through a hole in a thin braſs plate, cemented to a long and ſtrong piece of glaſs; which keeps it ſix or eight inches diſtant from any non-electric, and has a ſmall ball of wax or metal on its top to keep in the fire.

In a circle on the table which ſupports the wheel, are fixed 12 ſmall pillars of glaſs, at about 11 inches diſtance, with a thimble on the top of each. On the edge of the wheel is a ſmall leaden bullet, communicating by a wire with the gilding of the upper ſurface of the wheel; and about ſix inches from it, is another bullet communicating in like manner with the under ſurface. When the wheel is to be charged by the upper ſurface, a communication muſt be made from the under ſurface to the table. As ſoon as it is well charged, it begins to move. The bullet neareſt to a pillar moves towards the thimble on that pillar; and, paſſing by, electrifies it, and is then repelled from it. The ſucceeding bullet, which communicates with the other ſurface of the glaſs, more ſtrongly attracts that thimble on account of its being electrified before by the other bullet; and thus the wheel increaſes its motion, till the reſiſtance of the air regulates it. It will go half an hour; and make, one minute with another, 20 turns in a minute, which is 600 turns in the whole; the bullet in the upper ſurface giving in each turn 12 ſparks to the thimbles, making in all 2500 ſparks; while the ſame quantity of fire is thought to be received by the under bullet. The whole ſpace moved over by theſe bullets in the mean time is 2500 feet. If, inſtead of two bullets, you put eight, four communicating with the upper and four with the under ſurface, the force and ſwiftneſs will be greatly increaſed, and the wheel will make about 50 turns in a minute; but then, it will not continue moving for ſuch a long time. Theſe wheels may be applied to the ringing of chimes, and the moving of ſmall orreries, &c.

XXXVI. *The Magic Picture.*

This is a contrivance of Mr Kinnerſley; and is perhaps more calculated to give ſurpriſe, than any other experiment in electricity. It is made in the following manner: Having a large mezzotinto, with a frame and glaſs, (ſuppoſe of the king), take out the print, and cut a pannel out of it near two inches diſtant from the frame all round. If the cut be through the picture, it is nothing the worſe. With thin paſte, or gum water, fix the board that is cut off on the inſide of the glaſs, preſſing it ſmooth and cloſe; then fill up the vacancy, by gilding the braſs well with leaf-gold or braſs. Gild likewiſe the inner edge of the back of the frame all round, except the top part, and form a communication between that gilding and the gilding behind the glaſs; then put in the board, and that ſide is finiſhed. Turn up the glaſs, and gild the foreſide exactly over the back gilding; and when it is dry, cover it, by paſting on the pannel of the picture that has been cut out; obſerving to bring the correſpondent parts of the board and picture together, by which the picture will appear of a piece as at firſt; only part is behind the glaſs, and part before. Laſtly, hold the picture horizontally by the top, and place a little moveable gilt crown on the king's head. If now the picture is moderately electrified, and another perſon take hold of the frame with one hand, ſo that his fingers touch its inſide gilding, and with the other endeavour to take off the crown, he will receive a terrible blow, and fail in the attempt. The operator, who holds the picture by the upper end, where the inſide of the frame is not gilt, to prevent its falling, feels nothing of the ſhock; and may touch the face of the picture without danger, which he pretends to be a teſt of his loyalty.

XXXVII. *Imitations of the Planetary Motions.*

From the prime conductor ſuſpend ſix concentric hoops of metal, at different diſtances from each other; and under them, on a ſtand, place a metal plate at the diſtance of about half an inch. Then place upon the plate within each hoop, and near to it, a round glaſs bubble blown very light: theſe bubbles and the diſtances between the hoops ſhould correſpond to the different diameters of the planets and thoſe of their orbits; but as that cannot be on account of the vaſt diſproportion between them, it muſt ſuffice here to make a difference that bears ſome relation to them. Now, the hoops being electrified, the bubbles placed upon the plate, near the hoops, will be immediately attracted by them, and they will continue to move round the hoops as long as the electrification continues. If the electricity is very ſtrong, the bubbles will frequently be driven off from the hoops, and make a variety of ſurpriſing motions round their axis, and running hither and thither on the plate, after which they will come back to the hoops and run round them as before. If the room is darkened, all the glaſs balls will appear beautifully illuminated.

Another method of imitating the planetary motions is, by means of a hollow cork or pith ball, ſuſpended by a ſilk thread, as mentioned under the article Astronomy, n° 102. The ſame experiment will ſucceed with a metallic ball ſtrongly electrified either way. It is ſimilar to thoſe by Mr Grey formerly mentioned. As it will not ſucceed without the candle, (for a vial charged with an electricity oppoſite to the former will not do), it ſeems moſt likely that Mr Grey had ſucceeded in his experiments by the unheeded circumſtance of ſometimes having a candle near him when he made them. Other imitations of theſe motions have been contrived, and an ingenious perſon may contrive to vary theſe and other electrical experiments almoſt infinitely. Small orreries, planetariums, clocks, &c. have been conſtructed to go by the blaſt of electric matter iſſuing from a point: but as theſe are in no way connected with electricity, and would move as well by means of the draught of air through a chimney, or a current of water, we apprehend it is needleſs to give any particular deſcription of them.

XXXVIII. *The Thunder-houſe.*

Fig. 10. of Plate C. is an inſtrument repreſenting the ſide of a houſe, either furniſhed with a metallic conductor, or not; by which both the bad effects of lightning ſtriking upon a houſe not properly ſecured, and the uſefulneſs of metallic conductors, may be clearly repreſented. A is a board about three quarters of an inch thick, and ſhaped like the gable-end of a houſe. This board is fixed perpendicularly upon the bottom-board B, upon which the perpendicular glaſs pillar C D is alſo fixed in a hole about eight inches diſtant from the baſis of the board A. A ſquare hole I L M K, about a quarter of an inch deep, and nearly one inch wide, is made in the board A, and is filled with a ſquare piece of wood nearly of the ſame dimenſions. It is mentioned nearly of the ſame dimenſions, becauſe it muſt go ſo eaſily into the hole, that it may drop off by the leaſt ſhaking of the inſtrument. A wire L K is faſtened diagonally to this ſquare piece of wood. Another wire I H of the ſame thickneſs, having a braſs ball H, ſcrewed on its pointed extremity, is faſtened upon the board A; ſo alſo is the wire M N, which is ſhaped in a ring at O. From the upper extremity of the glaſs pillar C D, a crooked wire proceeds, having a ſpring ſocket F, through which a double knobbed wire ſlips perpendicularly, the lower knob G of which falls juſt above the knob H. The glaſs pillar D C muſt not be made very faſt into the bottom board; but it muſt be fixed ſo as it may be pretty eaſily moved round its own axis, by which means the braſs ball G may be brought nearer or farther from the ball H, without touching the part E F G. Now when the ſquare piece of wood L M I K (which may repreſent the ſhutter of a window or the like), is fixed into the hole ſo, that the wire L K ſtands in the dotted repreſentation I M, then the metallic communication from H to O is complete, and the inſtrument repreſents a houſe furniſhed with a proper metallic conductor: but if the ſquare piece of wood L M I K is fixed ſo, that the wire L K ſtands in the direction L K, as repreſented in the figure, then the metallic conductor H O, from the top of the houſe to its bottom, is interrupted at IM, in which caſe the houſe is not properly ſecured.

Fix the piece of wood LMIK ſo, that its wire may be as repreſented in the figure, in which caſe the metallic conductor HO is diſcontinued. Let the ball G be fixed at about half an inch perpendicular diſtance from the ball H; then, by turning the glaſs pillar DC, remove the former ball from the latter; by a wire or chain connect the wire EF with the wire Q of the jar P, and let another wire or chain, faſtened to the hook O, touch the outſide coating of the jar. Connect the wire Q with the prime conductor, and charge the jar: then, by turning the glaſs pillar DC, let the ball G came gradually near the ball H; and when they are arrived ſufficiently near one another, you will obſerve, that the jar explodes, and the piece of wood LMIK is puſhed out of the hole to a conſiderable diſtance from the thunder-houſe. Now the ball G, in this experiment, repreſents an electrified cloud, which when it is arrived ſufficiently near the top of the houſe A, the electricity ſtrikes it; and as this houſe is not ſecured with a proper conductor, the exploſion breaks off a part, *i. e.* knocks off the piece of wood IM.

Repeat the experiment with only this variation, *viz.* that this piece of wood IM is ſituated ſo, that the wire LK may ſtand in the ſituation IM, in which caſe the conductor HO is not diſcontinued; and you will obſerve, that the exploſion will have no effect upon the piece of wood LM, this remaining in the hole unmoved; which ſhows the uſefulneſs of the metallic conductor.

Further. Unſcrew the braſs ball H from the wire HI, ſo that this may remain pointed. With this difference only in the apparatus, repeat both the above experiments; and you will find that the piece of wood IM is in neither caſe moved from its place, nor any exploſion will be heard; which not only demonſtrates the preference of the conductors with pointed termination to thoſe with blunted ones; but alſo ſhows that a houſe, furniſhed with ſharp terminations, although not furniſhed with a regular conductor, is almoſt ſufficiently guarded againſt the effects of lightning. See THUNDER.

SECT. V. *Of the different Theories of Electricity, with the principal Experiments brought in favour of each, and which tend more particularly to ſhew the nature of the Electric Fluid.*

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IT is not to be ſuppoſed, that the phenomena of electricity would long be obſerved without attempts to account for them. In fact, this was attempted by Thales, who firſt obſerved the attractive power of amber. At this property he was ſo much ſurpriſed, that he reckoned the amber to be *animated.* With regard to the ſentiments of Theophraſtus on this ſubject, we are entirely in the dark; but, among the firſt electricians, all the phenomena were derived from *unctuous effluvia* emitted by the excited electric. Theſe were ſuppoſed to faſten upon all bodies in their way, and to carry back with them all that were not too heavy. For, at that time, effluvia of every kind were ſuppoſed to return to the bodies from which they were emitted; ſince nobody could otherwiſe account for the ſubſtance not being ſenſibly waſted by the conſtant emiſſion. When theſe light bodies on which the unctuous effluvia had faſtened were arrived at the excited electric, a freſh emiſſion of the effluvia was ſuppoſed to carry them back again. But this effect of the effluvia was not thought of till electric repulſion, as well as attraction, had been fully obſerved.

The diſcovery of a difference between conducting and non-conducting ſubſtances, threw conſiderable difficulties in the way of thoſe who maintained the hypotheſis of unctuous effluvia. When the Newtonian philoſophy began to be pretty generally received, the terms *attraction* and *repulſion* were quickly introduced into electricity, as well as other branches of philoſophy; and the electric effluvia, inſtead of being of an *unctuous* nature, were ſaid to be of an attractive or repulſive one. At the ſame time, the apparent ſtop which is put to the progreſs of theſe effluvia by any electric ſubſtance, introduced a queſtion not yet well decided, viz. Whether electric bodies are penetrable by the fluid or not.

48
Two electric fluids ſuppoſed by Mr du Fay.

When Mr Du Fay diſcovered the two oppoſite ſpecies of electricity, at that time diſtinguiſhed by the names of *vitreous* and *reſinous*, and afterwards by thoſe of *plus* and *minus*, or poſitive and negative, he formed the idea of two diſtinct electric fluids. Both theſe were ſuppoſed to have a *repulſive* power with reſpect to themſelves, but an *attractive* one with regard to one another.

As long as electrical attraction and repulſion were the only phenomena to be accounted for, this theory ſerved the purpoſe well enough. To account for attraction and repulſion by an *attractive* and *repulſive* power, was indeed no explication at all; but it afforded a change of terms, which is frequently enough miſtaken for an explanation both in electricity and other parts of philoſophy.—At laſt, however, Mr Du Fay dropped his opinion concerning the exiſtence of two electric fluids, and thought that all the phenomena might be accounted for from the action of a ſingle one. The vitreous or poſitive electricity, which was ſuppoſed to be the ſtronger, he thought might attract the negative, or weaker, electricity.—It is indeed true, that, in all experiments, the poſitive electricity doth manifeſt a ſuperiority in ſtrength over the negative, ſomething like that ſuperior degree of vigour which is obſerved in the north pole of a loadſtone over the ſouth pole. According to Mr Du Fay's own principles, however, had this been the caſe, a body poſitively electrified ought to have attracted one electrified negatively more weakly than one not electrified at all; which is contrary to experience.

49
Electric matter diſcovered to come from the earth.

During all this time, however, it was imagined, that the electric matter, whether it conſiſted of one or more fluids, was produced from the electric body by friction; but by a diſcovery of Dr Watſon's, it became univerſally believed, that the glaſs globes and tubes ſerved only to ſet the fluid in motion, but by no means to produce it.—He was led to this diſcovery by obſerving, that, upon rubbing the glaſs tube, while he was ſtanding upon cakes of wax or roſin, (in order, as he expected, to prevent any diſcharge of the electric matter upon the floor), the power was, contrary to his expectation, ſo much leſſened, that no ſnapping could be obſerved upon another perſon's touching any part of his body; but that, if a perſon not electrified held his hand near the tube while it was rubbed, the ſnapping was very ſenſible.—The event was the ſame when the globe was whirled in ſimilar circumſtances. For, if the man who turned the wheel, and who, together with the machine, was ſuſpended upon ſilk, touched the floor with one foot, the electric fire appeared upon the conductor; but if he kept himſelf free from any communication with the floor, little or no fire was produced.---He obſerved, that only a ſpark or two would appear between his hand and the inſulated machine, unleſs he at the ſame time formed a communication between the conductor and the floor; but that then, there was a conſtant and copious flux of the electric matter obſerved between them. From theſe, and ſome other experiments of a ſimilar kind, the Doctor diſcovered what he called the *complete circulation* of the electric matter. When he found, that, by cutting off the communication of the glaſs globe with the floor, all electric operations were ſtopped, he concluded, that the electric fluid was conveyed from the floor to the rubber, and from thence to the globe. For the ſame reaſon, ſeeing the rubber, or the man who had a communication with it, gave no ſparks but when the conductor was connected with the floor, he as naturally concluded, that the globe was ſupplied from the conductor, as he had before concluded that it was ſupplied from the rubber.---

50
Dr Watſon's theory of afflux and efflux.

From all this he was at laſt led to form a new theory of electricity, namely, that, in all electric operations, there was both an *afflux* of electric matter to the globe and the conductor, and likewiſe an *efflux* of the ſame electric matter from them.---Finding that a piece of leaf-ſilver was ſuſpended between a plate electrified by the conductor, and another communicating with the floor, he reaſons from it in the following manner. "No body can be ſuſpended in equilibrio but by the joint action of two different directions of power: ſo here the blaſt of electric ether from the floor ſetting through it, drives the ſilver towards the plate electrified. We find from hence, likewiſe, that the draught of electric ether from the floor is always in proportion to the quantity thrown by the globe over the gun-barrel (the prime conductor at that time made uſe of), or the equilibrium by which the ſilver is ſuſpended could not be maintained."---Some time after, however, the Doctor retracted this opinion concerning the afflux and efflux, and ſuppoſed that all the electric phenomena might be accounted for from the exceſs or diminution of the quantity of electric matter contained in different bodies. This theory was afterwards adopted by Dr Franklin, and continues to be generally received.

51
Difficulty concerning the direction of the electric fluid.

One great difficulty with which the firſt electricians were embarraſſed, (and which is yet ſcarcely removed), was to aſcertain the direction of the fluid. At firſt, all electric powers, as we have already obſerved, were ſuppoſed to reſide in the excited globe or glaſs tube. The electric ſpark therefore was ſuppoſed to proceed from the electrified body towards any conductor that was preſented towards it. It was never imagined there could be any difference in this reſpect, whether it was amber, glaſs, ſealing-wax, or any thing elſe that was excited. This progreſs of the electric matter was thought to be quite evident to the ſenſes; and therefore, the obſervation of electric appearances at an inſulated rubber occaſioned the greateſt aſtoniſhment.—In this caſe, the current could not be ſuppoſed to flow both from the rubber and the conductor, and yet the firſt appearances were the ſame. To provide a ſupply of the electric matter, therefore, philoſophers were obliged to ſuppoſe, that, notwithſtanding appearances were in both caſes much the ſame, the electric fluid was really emitted in one caſe by the electrified body, and received by it in the other. But now being obliged to give up the evidence from ſight for the manner of its progreſs, they were at a loſs, whether, in the uſual method of electrifying by excited glaſs, the fluid proceeded from the rubber to the conductor, or from the conductor to the rubber.—It was, however, ſoon found, that the electricity at the rubber was the reverſe of that at the conductor, and in all reſpects the ſame with that which had before been produced by the friction of ſealing-wax, ſulphur, roſin, &c. Seeing, therefore, that both the electricities were produced at the ſame time, by one and the ſame electric, and by the ſame friction, all philoſophers were naturally led to conclude, that both were modifications of one fluid; though in what manner that fluid was modified throughout the immenſe variety of electric phenomena, was a matter not eaſy to be determined.

52
Abbe Nollet's theory.

On this ſubject, the Abbe Nollet adopted the doctrine of *afflux* and *efflux* already mentioned. He ſuppoſed, that, in all electrical operations, the fluid is thrown into two oppoſite motions; that the afflux of this matter drives all light bodies before it by impulſe upon the electrified body, and its efflux carries them back again. He was, however, very much embarraſſed in accounting for facts where both theſe currents muſt be conſidered; as in the quick alternate attraction and repulſion of light bodies by an excited glaſs tube, or other excited electric. To obviate this difficulty, he ſuppoſes that every excited electric, and likewiſe every body to which electricity is communicated, has two orders of pores, one for the emiſſion of the effluvia, and another for the reception of them.—Mr de Tour improved upon Nollet's hypotheſis, and ſuppoſed that there is a difference between the affluent and effluent current; and that the particles of the fluid are thrown into vibrations of different qualities, which makes one of theſe currents more copious than the other, according as ſulphur or glaſs is uſed.---It is impoſſible, however, that ſuppoſitions ſo very arbitrary could be at all ſatisfactory, or received as proper ſolutions of the electric phenomena.

53
Different opinions concerning the nature of the electric fluid.

No leſs difficult was it for philoſophers to determine the nature of the electric fluid, than its manner of acting.---It had been in a manner generally believed, that *fire* was not a diſtinct element, but aroſe from ſome violent repulſions, rarefactions, &c. among the particles of ignited bodies. The great reſemblance of the electric fluid to elementary fire, however, ſeemed ſtrongly to militate againſt this opinion. The hypotheſis therefore of fire as a diſtinct principle or element, began to revive. Some maintained, that the electric fluid was really this principle; others thought that it was a fluid *ſui generis*, very much reſembling that of fire; while others, with Mr Boulanger at their head, imagined that it was nothing more than the finer parts of the atmoſphere, which crowded upon the ſurfaces of electric bodies, when the groſſer parts had been driven away by the friction of the rubber.

This laſt opinion, however, ſoon received a full re-

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Theory.

futation from the experiments of Dr Watſon abovementioned; by which it was proved, that the electric matter came not from the atmoſphere, but from the earth.---About the ſame time the Leyden phial was diſcovered, and the extraordinary effects of it rendered the inquiries into the nature of the electric fluid much more general than before. But ſtill, the violent prejudice againſt the exiſtence of fire as a real element or fluid diſtinct from terreſtrial bodies, continued in its full vigour, and the moſt extravagant theories were acquieſced in, rather than the ſimple poſition abovementioned.---It would be tedious, and indeed impoſſible, to give an account of all the theories which were now invented. One of the moſt remarkable, and moſt conſiſtent, was that of Mr Wilſon.---According to this gentleman, the chief agent in all the operations of electricity, is Sir Iſaac Newton's ether; which is more or leſs denſe in all bodies in proportion to the ſmallneſs of their pores, except that it is much denſer in ſulphureous and unctuous bodies. To this ether are aſcribed the principal phenomena of attraction and repulſion: the light, the ſulphureous or rather phoſphoreal ſmell with which violent electricity is always attended, and other ſenſible qualities, are aſcribed to the groſſer particles of bodies driven from them by the forcible action of this ether. He alſo endeavours to explain many electrical phenomena by means of a ſubtile medium at the ſurface of all bodies; which is the cauſe of the refraction and reflection of the rays of light, and alſo reſiſts the entrance and exit of this ether. This medium, he ſays, extends to a ſmall diſtance from the body, and is of the ſame nature with what is called the *electric fluid*. On the ſurface of conductors this medium is rare, and eaſily admits the paſſage of the electric fluid; whereas, on the ſurface of electrics, it is denſe and reſiſts it.—The ſame medium is rarefied by heat, which thus changes conductors into non-conductors.—By far the greater number of philoſophers, however, rejected the opinion of Mr Wilſon; and as they neither choſe to allow the electric fluid to be *fire* nor *ether*, they were obliged to own that it was a fluid *ſui generis*, i. e. one of whoſe nature they were totally ignorant.

54 Mr Wilſon's theory.

But, while philoſophers were thus embarraſſed in their electrical theories, a vaſt number of intereſting phenomena were diſcovered by the aſſiduity of a number of different electricians in different countries.—Mr Winckler obſerved, that if glaſs was rubbed on the inſide, it would ſhew ſtrong appearances of electricity on the outſide; which ſeemed to favour the opinion of the permeability of glaſs to the electric matter.—Other German electricians uſed ſeveral globes at a time, and imagined they found effects proportionable; though this has ſince been denied. Such a prodigious force, however, could they excite by means of theſe globes whirled by a large wheel, and rubbed by the hand or with woollen cloth, that, according to their own accounts, blood could be drawn from a finger by means of the electric ſpark, the ſkin would burſt, and a wound appear, as if made by a cauſtic. If ſeveral globes or tubes were uſed, they ſaid, that the motion of the heart and arteries would be very perceptibly increaſed in ſuch as were electrified; and that if a vein was opened in theſe circumſtances, the blood iſſuing from it would appear like lucid phoſphorus, and run out faſter than when the perſon was not electrified.—Mr P. Gordon, a Scots Benedictine monk, and profeſſor of philoſophy at Erfurd, increaſed the electric ſparks to ſuch a degree, that they were felt from a man's head to his foot, ſo that he could hardly take them without falling down with giddineſs, and ſmall birds were killed by them. This was effected by conveying the electricity with iron wires to the diſtance of 200 ells from the place of excitation. He alſo found, that the ſparks were ſtronger when the wires were thick than when they were ſmall.

55 Great power of electricity excited by ſome philoſophers.

56 Electric fluid found to act according to the largeneſs of electrified ſurface.

While the power of electricity was thus tried, another queſtion of great importance was likewiſe decided, namely, Whether electricity acted according to the largeneſs of the ſurface of bodies. This was found to be in proportion to the ſurface, and not the ſolid contents. The magnetic effluvia alſo were found not to interfere in the leaſt with the electrical ones. An electrified loadſtone attracted light bodies of all kinds by its electric virtue, at the ſame time that it attracted iron and ſteel by its peculiar magnetic virtue.—The attractive virtue of electricity was alſo found to pervade glaſs ſo powerfully, that a thread was attracted thro' five exhauſted receivers, and ſeemingly with more vigour than it would have been by the excited tube alone in the open air.

57 Dr Franklin's theory.

Such was the ſtate of philoſophical opinions concerning electricity, when Dr Franklin firſt invented his theory concerning poſitive and negative, or *plus* and *minus*, electricity. This had been already ſuggeſted by Dr Watſon, but was not ſo fully explained by him as by Dr Franklin; on which account the latter is generally reckoned to be the ſole inventor. According to this theory, all the operations in electricity depend upon one fluid *ſui generis*, extremely ſubtile and elaſtic. Between the particles of this fluid there ſubſiſts a very ſtrong repulſion with regard to each other, and as ſtrong an attraction with regard to other matter. Thus, according to Dr Franklin's hypotheſis, one quantity of electric matter will repel another quantity of the ſame, but will attract and be attracted by any terreſtrial matter that happens to be near it. The pores of all bodies are ſuppoſed to be full of this ſubtile fluid; and when its equilibrium is not diſturbed, that is, when there is in any body neither more nor leſs than its natural ſhare, or than that quantity which it is capable of retaining by its own attraction, the fluid does not manifeſt itſelf to our ſenſes. The action of the rubber upon an electric diſturbs this equilibrium, occaſioning a deficiency of the fluid in one place, and a redundancy of it in another. This equilibrium being forcibly diſturbed, the mutual repulſion of the particles of the fluid is neceſſarily exerted to reſtore it. If two bodies be both of them overcharged, the electric atmoſpheres repell each other, and both the bodies recede from one another to places where the fluid is leſs denſe. For as there is ſuppoſed to be a mutual attraction between all bodies and the electric fluid, ſuch bodies as are electrified muſt go along with their atmoſpheres. If both the bodies are exhauſted of their natural ſhare of this fluid, they are both attracted by the denſer fluid exiſting either in the atmoſphere contiguous to them, or in other neighbouring bodies; which occaſions them ſtill to recede from one another as if they were overcharged.

This is the Franklinian doctrine concerning the cauſe

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58 Difficulty concerning the reaſon why bodies negatively electrified repel one another.

59 Different ſolutions of this difficulty.

of electric attraction and repulſion; but it is evident, that the reaſon juſt now given why bodies negatively attracted ought to repel one another, is by no means ſatisfactory. Dr Franklin himſelf had framed his hypotheſis before he knew that bodies negatively electrified would repel one another; and when he came afterwards to learn it, he was ſurpriſed, and acknowledged that he could not ſatisfactorily account for it *.—Other philoſophers therefore invented different ſolutions of this difficulty, of which that above mentioned is one. But by ſome this was rejected. They ſaid, that as the denſer electric fluid, ſurrounding two bodies negatively electrified, acts equally on all ſides of thoſe bodies, it cannot occaſion their repulſion. The repulſion, according to them, is owing rather to an accumulation of the electric on the ſurfaces of the two bodies; which accumulation is produced by the attraction and the difficulty the fluid finds in entering them. This difficulty is ſuppoſed chiefly to be owing to the air on the ſurface of bodies, which Dr Prieſtley ſays is probably a little condenſed there. This he deduces from an experiment of Mr Wilſon, corrected by Mr Canton. The experiment was made in order to obſerve the courſe of the electric light through a Torricellian vacuum. A ſingular appearance of light was obſerved upon the ſurface of the quickſilver, at which the fluid was ſuppoſed to enter. Mr Wilſon ſuppoſed that this was owing to a ſubtile medium ſpread over the ſurface of the quickſilver, and which prevented the eaſy entrance of the electric fluid. But this was afterwards diſcovered by Mr Canton to be owing to a ſmall quantity of air which had been left in the tube. It is plain, however, that as the attraction is equal all round, and likewiſe the difficulty with which the fluid penetrates the air, bodies negatively electrified ought not to repel one another on this ſuppoſition more than the former. Nay, they ought to attract each other; becauſe, in the place of contact, the reſiſtance of the air would be taken off, and the electric fluid could come from all other quarters by the attraction of the bodies.

60 Mr Cavallo's ſolution.

Mr Cavallo, who ſeems to have undertaken the defence of this hypotheſis in all caſes, gives another reaſon why bodies negatively electrified ſhould repel each other. In a chapter entitled, "A Compendious view of the principal properties of Electricity," among others he gives the following: "No electricity can be obſerved upon the ſurface of any electrified body, except that ſurface is contiguous to an electric, which electric can ſome how or other acquire a contrary electricity at a little diſtance. Otherwiſe:—No electricity can appear upon the ſurface of any electrified body, except that ſurface is oppoſite to another body which has actually acquired the contrary electricity, and theſe contrarily electrified bodies are ſeparated by an electric. On conſidering this principle, (adds he), it may be aſked, Why any electricity can be obſerved upon the ſurface of an electrified body that is inſulated at a conſiderable diſtance from other conductors? Or, Which is the electric that is contiguous to the ſurface of an electrified conductor or excited electric, and which has actually acquired a contrary electricity at a little diſtance from the ſaid ſurface? To this queſtion it is anſwered, that the air is, in general, the electric which is oppoſite to the ſurface of any electrified body; which, not being a perfect conductor, does eaſily acquire a contrary electricity on a ſtratum of its ſubſtance that is at a little diſtance from the electrified body; and, in conſequence of this ſtratum, it acquires another ſtratum contrarily electrified, and at a little diſtance from the former: to this, other ſtrata ſucceed, alternately poſſeſſed of poſitive and negative electricities, and decreaſing in power till they vaniſh. This aſſertion is eaſily proved by ſeveral experiments, particularly the following. If the end of a pretty long glaſs tube be preſented to a body electrified, for inſtance, poſitively, the tube will be found electrified poſitively alſo for the ſpace of one or two inches at that end; but beyond that ſpace, will be found two or three inches electrified negatively: after that another poſitive electricity will appear; and ſo alternately, a poſitive and a negative zone will follow one another, always weaker and weaker in power, till at laſt they quite vaniſh. This ſhows, that, in general, when an electric ſufficiently denſe is preſented to an electrified body, it acquires ſucceſſive zones or ſtrata of poſitive and negative electricity."

From this fact, (which, with the utmoſt impropriety, he terms a *law* of electricity, whereas it is moſt evidently the *effect* of a law, and not the law itſelf,) Mr Cavallo gives the following reaſon why bodies negatively electrified repel one another. "As to the repulſion exiſting between bodies poſſeſſed of the ſame electricity; in order to underſtand its explanation thoroughly, the reader muſt be reminded of the principle above-mentioned, which is, that no electricity, *i. e.* the electric fluid proper to a body, can either be augmented or diminiſhed upon the ſurface of that body, except the ſaid ſurface is contiguous to an electric, which can acquire a contrary electricity at a little diſtance: from whence it follows, that no electricity can be diſplayed upon the facing ſurfaces of two bodies that are ſufficiently near to one another, and both poſſeſſed of the ſame electricity; for the air that lies between thoſe contiguous ſurfaces has no liberty of acquiring any contrary electricity. This being premiſed, the explanation of electric repulſion becomes very eaſy. Suppoſe, for inſtance, that two ſmall bodies are freely ſuſpended by inſulated threads; ſo that, when they are not electrified, they may hang contiguous to one another. Now ſuppoſe theſe bodies to be electrified either poſitively or negatively, and then they muſt repel one another: for either the increaſed or the diminiſhed natural quantity of electric fluid in theſe bodies will endeavour to diffuſe itſelf equally over every part of the ſurfaces of theſe bodies; and this endeavour will cauſe the ſaid bodies to recede from each other, ſo that a quantity of air may be interpoſed between their ſurfaces, ſufficient to acquire a contrary electricity at a little diſtance from the ſaid ſurfaces. Otherwiſe: If the bodies poſſeſſed of the ſame electricity do not repel each other, ſo that a ſufficient quantity of air may be interpoſed between their ſurfaces, the increaſed quantity of electric fluid when the bodies are electrified poſitively, or the remnant of it when they are electrified negatively, by the above principle cannot be diffuſed equally throughout or over the ſurfaces of theſe bodies; for no electricity can appear upon the ſurfaces of bodies in contact, or that are very near each other. But the electric fluid, by attracting the particles of matter, endeavours to diffuſe itſelf equally throughout or over the ſurfaces of theſe bodies; therefore the ſaid bodies are, by this endeavour,

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* *Franklin's Letters*

deavour, forced to repel one another."

61 Inſufficient.

This theory is evidently no ſolution of the difficulty; ſeeing it is only explaining one fact by another, which requires explanation at leaſt as much as the firſt. But though this ſhould be overlooked, it is ſtill inſufficient; for, granting that bodies negatively electrified ought to repel one another till the electricity is equally diffuſed along their ſurfaces, yet when this is accompliſhed, the repulſion ought to ceaſe. Now, there is no occaſion for ſuppoſing the bodies to be electriſied while they are in contact, or nearly ſo. One may be electrified negatively in one corner of a room, and another in the other. The electrification may alſo be continued for any length of time we pleaſe, ſo that it is not poſſible to ſuppoſe but the electric matter muſt have diffuſed itſelf equally along the ſurfaces of both: yet, if we attempt to bring theſe bodies together, we ſhall find that they will repel each other very violently; which ought not to be the caſe, according to Mr Cavallo's ſuppoſition.

62 Dr Franklin's explanation of the phenomena of the Leyden phial.

What gave the greateſt reputation to Dr Franklin's theory, however, is the eaſy ſolution which it affords of all the phenomena of the Leyden phial. The fluid is ſuppoſed to move with the greateſt eaſe in bodies which are conductors, but with extreme difficulty in *electrics per ſe;* inſomuch that glaſs is abſolutely impermeable to it. It is moreover ſuppoſed, that all electrics, and particularly glaſs, on account of the ſmallneſs of their pores, do at all times contain an exceeding great, and always an equal quantity of this fluid; ſo that no more can be thrown into any one part of any electric ſubſtance, except the ſame quantity go out at another, and the gain be exactly equal to the loſs. Theſe things being previouſly ſuppoſed, the phenomena of charging and diſcharging a plate of glaſs admit of an eaſy ſolution. In the uſual manner of electrifying by a ſmooth glaſs globe, all the electric matter is ſupplied by the rubber from all the bodies which communicate with it. If it be made to communicate with nothing but one of the coatings of a plate of glaſs, while the conductor communicates with the other, that ſide of the glaſs which communicates with the rubber muſt neceſſarily be exhauſted in order to ſupply the conductor, which muſt convey the whole of it to the ſide with which it communicates. By this operation, therefore, the electric fluid becomes almoſt entirely exhauſted on one ſide of the plate, while it is as much accumulated on the other; and the diſcharge is made by the electric fluid ruſhing, as ſoon as an opportunity is given it by means of proper conductors, from the ſide which was overloaded, to that which is exhauſted.

It is not, however, neceſſary to this theory, that the very ſame individual particles of electric matter which were thrown upon one ſide of the plate, ſhould make the whole circuit of the intervening conductors, eſpecially in very great diſtances, ſo as actually to arrive at the exhauſted ſide. It may be ſufficient to ſuppoſe, that the additional quantity of fluid diſplaces and occupies the ſpace of an equal portion of the natural quantity of fluid belonging to thoſe conductors in the circuit which lay contiguous to the charged ſide of the glaſs. This diſplaced fluid may drive forwards an equal quantity of the ſame matter in the next conductor; and thus the progreſs may continue till the exhauſted ſide of the glaſs is ſupplied by the fluid naturally exiſting in the conductors contiguous to it. In this caſe, the motion of the electric fluid, in an exploſion, will rather reſemble the vibration of the air in ſounds, than a current of it in winds.

It will eaſily be acknowledged, (ſays Dr Prieſtley,), that while the ſubſtance of the glaſs is ſuppoſed to contain as much as it can poſſibly hold of the electric fluid, no part of it can be forced into one of the ſides, without obliging an equal quantity to quit the other ſide: but it may be thought a difficulty upon this hypotheſis, that one of the ſides of a glaſs plate cannot be exhauſted, without the other receiving more than its natural ſhare; particularly, as the particles of this fluid are ſuppoſed to be repulſive of one another. But it muſt be conſidered, that the attraction of the glaſs is ſufficient to retain even the large quantity of electric fluid which is natural to it, againſt all attempts to withdraw it, unleſs that eager attraction can be ſatisfied by the admiſſion of an equal quantity from ſome other quarter. When this opportunity of a ſupply is given, by connecting one of the coatings with the rubber, and the other with the conductor, the two attempts to introduce more of the fluids into one of the ſides are made, in a manner, at the ſame inſtant. The action of the rubber tends to diſturb the equilibrium of the fluid in the glaſs; and no ſooner has a ſpark quitted one of the ſides, to go to the rubber, than it is ſupplied by the conductor on the other; and the difficulty with which theſe additional particles move in the ſubſtance of the glaſs, effectually prevents its reaching the oppoſite exhauſted ſide. It is not ſaid, however, but that either ſide of the glaſs may give or receive a ſmall quantity of the electric fluid, without altering the quantity on the oppoſite ſide. It is only a very conſiderable part of the charge that is meant, when one ſide is ſaid to be filled while the other is exhauſted.

It is a little remarkable, adds Dr Prieſtley, that the electric fluid in this, and in every other hypotheſis, ſhould ſo much reſemble the ether of Sir Iſaac Newton in ſome reſpects, and yet differ from it ſo eſſentially in others. The electric fluid is ſuppoſed to be, like ether, extremely ſubtile and elaſtic, that is, repulſive of itſelf; but inſtead of being, like the ether, repelled by all other matter, it is ſtrongly attracted by it: ſo that, far from being, like the ether, rarer in the ſmall than in the large pores of bodies, rarer within the bodies than at their ſurfaces, and rarer at their ſurfaces than at any diſtance from them; it muſt be denſer in ſmall than in large pores, denſer within the ſubſtance of bodies than at their ſurfaces, and denſer at their ſurfaces than at a diſtance from them.

63 Attraction and repulſion thro' glaſs accounted for.

To account for the attraction of light bodies, and othere lectrical appearances, in air of the ſame denſity with the common atmoſphere, when glaſs (which is ſuppoſed to be impermeable to electricity) is interpoſed; it is conceived, that the addition or ſubtraction of the electric fluid, by the action of the excited electric on one ſide of the glaſs, occaſions, as in the experiment of the Leyden phial, a ſubtraction or addition of the fluid on the oppoſite ſide. The ſtate of the fluid, therefore, on the oppoſite ſide being altered, all light bodies within the ſphere of its action muſt be affected in the very ſame manner as if the effluvia of the excited electric had actually penetrated the glaſs, according to the opinions of all electricians before Dr Franklin.

This hypotheſis has been in ſome meaſure improved by Mr Æpinus, in a treatiſe entitled, "Tentamen theoriæ Electricitatis & Magnetiſmi." He extends the property of impermeability to air, and all electrics, as well as glaſs. He ſuppoſes *impermeability* to conſiſt in the great difficulty with which electric ſubſtances admit the fluid into their pores, and the ſlowneſs with which it moves in them. In conſequence of this impermeability of air to the electric fluid, he denies the exiſtence of electric atmoſpheres, and thinks that Dr Franklin's theory will do much better without them. He alſo imagines, that all the particles of matter are repulſive of one another: for that otherwiſe (ſince all ſubſtances have in them a certain quantity of the electric fluid, the particles of which repel one another and are attracted by all other matter), it could not happen, that bodies in their natural ſtate with reſpect to electricity, ſhould neither attract nor repel one another. He alſo introduces a number of mathematical calculations; the reſult of which (ſays Dr Prieſtley, with a great deal of probability) cannot be depended upon.

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Principles on which Dr Franklin's theory depends.

The above is a full explanation of the theory of electricity at preſent moſt generally received. It depends on the following principles. 1. All terreſtrial ſubſtances, as well as the atmoſphere which ſurrounds the earth, are full of electric matter. 2. Glaſs, and other electric ſubſtances, though they contain a great deal of electric matter, are nevertheleſs *impermeable* by it. 3. This electric matter violently repels itſelf, and attracts all other matter. 4. By the excitation of an electric, the equilibrium of the fluid contained in it is broken; and one part of it is overloaded with electricity, while the other contains too little. 5. Conducting ſubſtances are permeable to the electric matter through their whole ſubſtance, and do not conduct it merely over their ſurface. 6. Poſitive electricity is when a body has too much of the electric fluid, and negative electricity when it has too little. Of theſe poſitions we ſhall now adduce thoſe proofs drawn from different facts, which ſeem in the ſtrongeſt manner to confirm them.

I. "All terreſtrial ſubſtances, as well as the atmoſphere which ſurrounds the earth, are filled with electric fluid."—Of this the proofs are very eaſy. There is no place of the earth or ſea, where the electric fire may not be collected by making a communication between it and the rubber of an electric machine. Therefore, conſidering that the whole earth is moiſt, that moiſture is a conductor of electricity, and that every part of the earth muſt thus communicate with another, it is certain that the electric matter muſt diffuſe itſelf as far as the moiſture of the earth reaches; and this we may reaſonably ſuppoſe to be to the very centre.

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Proofs of atmoſpherical electricity.

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Mr Cavallo's directions concerning the electrical kite.

With regard to the atmoſphere, the caſe is equally clear. We have formerly mentioned in general, that Dr Franklin, and others, had collected electricity from the atmoſphere in great quantity during the time of thunder-ſtorms; but it is now found that it may be collected from the air at any time. The beſt inſtrument for this purpoſe is the electrical kite. Mr Cavallo, who hath made a great many experiments in atmoſpherical electricity, obſerves that the whole power of this machine lies in the ſtring. A common ſchool-boy's kite anſwers the purpoſe as well as any other. The beſt method of making the ſtring is by twiſting two threads of common twine with one of that copper-thread which is uſed for trimmings. When a kite conſtructed in this manner was raiſed, he ſays, he always obſerved the ſtring to give ſigns of electricity, except once. The weather was warm, and the wind ſo weak, that the kite was raiſed with difficulty, and could hardly be kept up for a few minutes. Afterwards, however, when the wind increaſed, he obtained, as uſual, a pretty ſtrong poſitive electricity. Concerning the management of this kite he gives the following directions.

"In raiſing the kite, when the weather is very cloudy and rainy, in which time there is danger of meeting with a great quantity of electricity, I generally uſe to hang upon the ſtring A B (Plate CI. fig. 2.) the hook of a chain C, the other extremity of which falls on the ground. Sometimes I uſe another caution beſides, which is to ſtand upon an inſulating ſtool; in which ſituation, I think, that if any quantity of electricity, ſuddenly diſcharged by the clouds, ſtrikes the kite, it cannot much affect any perſon. As to inſulated reels, and other ſuch like inſtruments that ſome gentlemen have uſed to raiſe the kite without any danger of receiving a ſhock; fit for the purpoſe as they may appear in theory, they are yet very inconvenient to be managed. Except the kite be raiſed in the time of a thunder-ſtorm, there is no great danger for the operator to receive any ſhock. Although I have raiſed my electrical kite hundreds of times without any caution whatever, I have very ſeldom received a few exceedingly ſlight ſhocks in my arms. In time of a thunder-ſtorm, if the kite has not been raiſed before, I would not adviſe a perſon to raiſe it while the ſtormy clouds are juſt overhead; the danger at ſuch a time being very great, even with the precautions abovementioned: at that time the electricity of the clouds may be obſerved, without raiſing the kite, by a corkball electrometer held in the hand in an open place, or, if it rains, by the electrometer for rain, to be deſcribed hereafter.

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Quality of electricity how obſerved.

"When the kite has been raiſed, I generally introduce the ſtring thro' a window into a room of the houſe, and faſten it to a ſtrong ſilk lace, the extremity of which is generally tied to a heavy chair in the room. In fig. 14. of Plate XCIX. A B repreſents part of the ſtring of the kite which comes within the room; C repreſents the ſilk lace; D E a ſmall prime conductor, which, by means of a ſmall wire, is connected with the ſtring of the kite; and F repreſents the quadrant electrometer fixed upon a ſtand of glaſs covered with ſealing wax, which I uſed to put near the prime conductor rather than to fix it in a hole upon the conductor, becauſe the ſtring A B ſometimes ſhakes ſo as to pull the prime conductor down, in which caſe the quadrant electrometer would be broken. G repreſents a glaſs tube about 18 inches long, with a knobbed wire cemented to its extremity; which inſtrument I uſe to obſerve the quality of the electricity, when the electricity of the kite is ſo ſtrong, that I think it not ſafe to come very near the ſtring. The method is as follows. I hold the inſtrument by that extremity of the glaſs tube which is fartheſt from the wire, and touch the ſtring of the kite with the knob of its wire; which being inſulated, acquires a ſmall quantity of electricity from it, which is ſufficient to aſcertain its quality when the knob of the inſtrument is brought near an electrified electrometer. Sometimes when I raiſe the kite in the night-time, out of the houſe, where I have not the convenience of obſerving the quality by the attraction and repulſion, or even by the appearance of the electric light, I make uſe of a coated phial, which I can charge at the ſtring; and, when charged, put into my pocket, where it will keep charged even for ſeveral hours. The conſtruction of this phial is as follows. Beſides the coating on the inſide and outſide, which this phial has in common with others of the ſame kind, a glaſs tube open at both ends is cemented into its neck, and proceeds within the phial, having a ſmall wire faſtened to its lower extremity, which touches the inſide non-electric coating. The wire, with the knob of this phial, is cemented into another glaſs tube, which is nearly twice as long, and ſmaller than the tube cemented into the neck of the phial. The wire is cemented ſo, that only its knob projects out of one end, and a ſmall length of it out of the other end of the tube. If this piece with the wire be held by the middle of the glaſs tube, it may be put in or out of the tube which is in the neck of the phial, ſo as to touch the ſmall wire at the lower extremity of it, and that without diſcharging the phial if it is charged. I have kept ſuch a phial charged for ſix weeks together, and probably it would keep much longer if it was to be tried.

"By making uſe of this inſtrument, I am obliged to keep the kite up no longer than it is neceſſary to charge the phial, in order to obſerve the quality of the electricity in the atmoſphere; for after the kite has been drawn in, and brought home, I can then examine the electricity of the inſide of the phial, which is the ſame as that of the kite. When the electricity of the kite is very ſtrong, I fix a chain communicating with the ground, at about ſix inches diſtance from the ſtring, which may carry off its electricity in caſe this ſhould increaſe ſo much as to put the byſtanders in danger."

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With all his caution, however, it ſeems Mr Cavallo could not always avoid danger, even when there was no thunder; as appears from the following account.—"October 18th, 1775. After having rained a great deal in the morning and night before, the weather became a little clear in the afternoon, the clouds appearing ſeparated, and pretty well defined. The wind was weſt, and rather ſtrong, and the atmoſphere in a temperate degree of heat. In theſe circumſtances, at three P. M. I raiſed my electrical kite with 360 feet of ſtring. After the end of the ſtring had been inſulated, and a leather ball covered with tin-foil had been hanged to it, I tried the power and quality of the electricity, which appeared to be poſitive and pretty ſtrong. In a ſhort time, a ſmall cloud paſſing over, the electricity increaſed a little; but the cloud being gone, it decreaſed again to its former degree. The ſtring of the kite was now faſtened by the ſilk lace to a poſt in the yard of the houſe, and I was repeatedly charging two coated phials and giving ſhocks with them. While I was ſo doing, the electricity, which was ſtill poſitive, began to decreaſe, and in two or three minutes it became ſo weak that it could hardly be perceived with a very ſenſible cork-ball electrometer. Obſerving at the ſame time, that a large and black cloud was approaching the zenith (which, no doubt, cauſed the decreaſe of electricity), indicating imminent rain, I introduced the end of the ſtring through a window in a firſt-floor room, wherein I faſtened it by the ſilk lace to an old chair. The quadrant electrometer was ſet upon the ſame window, and was by means of a wire connected with the ſtring of the kite. Being now three quarters after three o'clock, the electricity was abſolutely imperceptible: however, in about three minutes time it became again perceptible; but, upon trial, was now found to be negative. It is therefore plain, that its ſtopping was nothing more than a change from poſitive to negative; which was evidently occaſioned by the approach of the cloud, part of which by this time had reached the zenith of the kite, and the rain alſo had begun to fall in large drops. The cloud alſo came farther on; the rain increaſed; and the electricity keeping pace with it, the electrometer ſoon arrived at 15°. Seeing now that the electricity was pretty ſtrong, I began again to charge the two coated phials, and to give ſhocks with them; but the phials had not been charged above three or four times, before I perceived that the index of the electrometer was arrived at 35°, and was keeping ſtill increaſing. The ſhocks being now very ſmart, I deſiſted from charging the phials any longer; and, conſidering the rapid advance of the electricity, thought to take off the inſulation of the ſtring, in caſe that, if it ſhould increaſe farther, it might ſilently be conducted to the earth without cauſing any bad accident by being accumulated in the inſulated ſtring. To effect this, as I had no proper apparatus near me, I thought to remove the ſilk lace, and faſten the ſtring itſelf to the chair. Accordingly I diſengaged the wire that connected the electrometer with the ſtring; laid hold of the ſtring; untied it from the ſilk lace, and faſtened it to the chair: but while I effected this, which took up leſs than half a minute of time, I received about 12 or 15 very ſtrong ſhocks, which I felt all along my arms, in my breaſt, and legs; ſhaking me in ſuch a manner, that I had hardly power enough to effect my purpoſe, and to warn the people in the room to keep their diſtance. As ſoon as I took my hands off the ſtring, the electricity (in conſequence of the chair being a bad conductor) began to ſnap between the ſtring and the ſhutter of the window, which was the neareſt body to it. The ſnappings, which were audible at a good diſtance out of the room, were at firſt iſochronous with the ſhocks which I had received; but, in about a minute's time, oftener; ſo that the people of the houſe compared their ſound to the rattling noiſe of a jack going when the fly is off. The cloud now was juſt over the kite; it was black, and well defined, almoſt of a circular form, its diameter appearing to be about 40°. The rain was copious, but not remarkably heavy. As the cloud was going off, the electrical ſnapping began to weaken, and in a ſhort time became inaudible. I went then near the ſtring, and finding the electricity weak, but ſtill negative, I inſulated it again, thinking to keep up the kite ſome time longer: but obſerving that another larger and denſer cloud was approaching towards the zenith, and I had then no proper apparatus at hand to prevent every poſſible bad accident, reſolved to pull the kite in: accordingly a gentleman who was by me began pulling it in, while I was wind-

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ing up the ſtring. The cloud was now very nearly over the kite; and the gentleman told me that he had received one or two ſlight ſhocks in his arms; and that, if he was to receive another, he would certainly let the ſtring go: upon which I laid hold of the ſtring, and pulled the kite in as faſt as I could without any farther obſervation; being then ten minutes after four o'clock.—*N. B.* There was neither thunder nor lightning perceived that day, nor indeed for ſome days before or after."

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Another inſtrument for obſerving the electricity of the atmoſphere.

Beſides the kite, Mr Cavallo has given us the following deſcription of ſome other inſtruments he uſes for diſcovering the electricity of the atmoſphere. "Fig. 11. of Plate C. repreſents a very ſimple inſtrument for making experiments on the electricity of the atmoſphere; and which, on ſeveral accounts, ſeems to be the moſt proper for that purpoſe. A B is a common jointed fiſhing-rod, without the laſt or ſmalleſt joint. From the extremity of this rod proceeds a ſlender glaſs tube C, covered with ſealing-wax, and having a cork D at its end, from which a pith-ball electrometer is ſuſpended. H G I is a piece of twine faſtened to the other extremity of the rod, and ſupported at G by a ſmall ſtring F G. At the end (I) of the twine, a pin is faſtened; which when puſhed into the cork D, renders the electrometer E uninſulated. When I would obſerve the electricity of the atmoſphere with this inſtrument, I thruſt the pin (I) into the cork D; and holding the rod by its lower end A, project it out from a window in the upper part of the houſe, into the air, raiſing the end of the rod with the electrometer, ſo as to make an angle of about 50 or 60° with the horizon. In this ſituation I keep the inſtrument for a few ſeconds; and then pulling the twine at H, the pin is diſengaged from the cork D: which operation cauſes the ſtring to drop in the dotted ſituation K L; and leaves the electrometer inſulated, and electrified with an electricity contrary to that of the atmoſphere. This done, I draw the electrometer into the room; and examine the quality of the electricity, without obſtruction either from wind or darkneſs. With this inſtrument I have made obſervations on the electricity of the atmoſphere ſeveral times in a day, for ſeveral months; and from them I have deduced the following general obſervations, which ſeem to coincide with thoſe made with the kites.

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Concluſions drawn from the experiments.

"1. That there is in the atmoſphere at all times a quantity of electricity; for whenever I uſe the abovementioned inſtrument, it always acquires ſome electricity.

"2. That the electricity of the atmoſphere, or fogs, is always of the ſame kind, namely, poſitive; for the electrometer is always negative, except when it is evidently influenced by heavy clouds near the zenith.

"3. That, in general, the ſtrongeſt electricity is obſervable in thick fogs, and alſo in froſty weather; and the weakeſt, when it is cloudy, warm, and very near raining: but it does not ſeem to be leſs by night than in the day.

"4. That in a more elevated place the electricity is ſtronger than in a lower one; for having tried the atmoſpherical electrometer both in the ſtone, and iron gallery on the cupola of St Paul's cathedral, I found that the balls diverged much more in the latter than in the former leſs elevated place. Hence it appears, that if this rule takes place at any diſtance from the earth, the electricity in the upper regions of the atmoſphere muſt be exceedingly ſtrong."

The concluſions drawn from the experiments with the kites, are as follow.

"1. The air appears to be electrified at all times; its electricity is conſtantly poſitive, and much ſtronger in froſty than in warm weather; but it is by no means leſs in the night than in the day time.

"2. The preſence of the clouds generally leſſens the electricity of the kite; ſometimes it has no effect upon it; and it is very ſeldom that it increaſes it a little." To this, the above-mentioned inſtance is a moſt remarkable exception.

"3. When it rains, the electricity of the kite is generally negative, and very ſeldom poſitive.

"4. The aurora borealis ſeems not to affect the electricity of the kite.

"5. The electric ſpark taken from the ſtring of the kite, or from any inſulated conductor connected with it, eſpecially when it does not rain, is very ſeldom longer than a quarter of an inch; but it is exceedingly pungent. When the index of the electrometer is not higher than 20°, the perſon that takes the ſpark will feel the effect of it in his legs; it appearing more like the diſcharge of an electric jar, than the ſpark taken from the prime conductor of an electrical machine.

"6. The electricity of the kite is generally ſtronger or weaker, according as the ſtring is longer or ſhorter; but it does not keep any exact proportion to it. The electricity, for inſtance, brought down by a ſtring of 100 yards, may raiſe the index of the electrometer to 20, when, with double that length of ſtring, the index of the electrometer will not go higher than 25.

"7. When the weather is damp, and the electricity is pretty ſtrong, the index of the electrometer, after taking a ſpark from the ſtring, or preſenting the knob of a coated vial to it, riſes ſurpriſingly quick to its uſual place; but in dry and warm weather it riſes exceedingly ſlow."

70
Electrome ter for ra deſcribed.

From theſe obſervations, little doubt can be entertained of the atmoſphere's being always full of electric matter. From Mr Cavallo's obſervations, however, it appears alſo, that the rain which deſcends from the clouds is full of electric matter. The method of proving this, is by an inſtrument called by Mr Cavallo an *electrometer for rain*, and of which he gives the following deſcription. "A B C I, Plate XCIX. fig. 12. is a ſtrong glaſs tube about two feet and a half long, having a tin funnel D E cemented to its extremity, which funnel defends part of the tube from the rain. The outſide ſurface of the tube from A to B, is covered with ſealing-wax; ſo alſo is the part of it which is covered by the funnel. F D is a piece of cane, round which braſs wires are twiſted in different directions, ſo as to catch the rain eaſily, and at the ſame time to make no reſiſtance to the wind. This piece of cane is fixed into the tube; and a ſlender wire proceeding from it goes through the bore of the tube, and communicates with the ſtrong wire A G, which is thruſt into a piece of cork faſtened to the end A of the tube. The end G of the wire A G is formed in a ring, from which I ſuſpend a more or leſs ſenſible pith-ball electrometer as occaſion requires. This inſtrument is faſtened to the ſide of the window-frame, where it is ſupported by ſtrong braſs hooks at C B; which part of the tube is covered with a ſilk lace, in order to adapt it better to the hooks. The part F C is out of the window, with the end F elevated a little above the horizon. The remaining part of the inſtrument comes through a hole in one of the lights of the ſaſh within the room, and no more of it touches the ſide of the window than the part C B. When it rains, eſpecially in paſſing ſhowers, this inſtrument, ſtanding in the ſituation above deſcribed, is frequently electrified; and, by the diverging of the electrometer, the quantity and quality of the electricity of the rain may be obſerved, without any danger of a miſtake. With this inſtrument I have obſerved, that the rain is generally, though not always, electrified negatively; and ſometimes ſo ſtrongly, that I have been able to charge a ſmall coated phial at the wire A G. This inſtrument ſhould be fixed in ſuch a manner that it may be eaſily taken off from the window, and replaced again as occaſion requires; for it will be neceſſary to clean it very often, particularly when a ſhower of rain is approaching.

71
Pocket electrometer deſcribed.

“ Plate C. fig. 12. repreſents a pocket electrometer, which on ſeveral accounts ſeems preferable to thoſe generally in uſe. The caſe or handle of this electrometer is formed by a glaſs tube about three inches long, and three tenths of an inch in diameter, half of which is covered with ſealing-wax. From one extremity of this tube, *viz.* that without ſealing-wax, a ſmall loop of ſilk proceeds, which ſerves occaſionally to hang the electrometer on a pin, &c. To the other extremity of the tube a cork is adapted, which, being cut tapering on both ends, can fit the mouth of the tube with either end. From one extremity of this cork, two linen threads proceed, a little ſhorter than the length of the tube, ſuſpending each a little cone of pith of alder. When this electrometer is to be uſed, that end of the cork which is oppoſite to the threads, is puſhed into the mouth of the tube; then the tube forms the inſulated handle of the pith electrometer as repreſented fig. 13. But when the electrometer is to be carried in the pocket, then the threads are put into the tube, and the cork ſtops it as repreſented fig. 12. The peculiar advantages of this electrometer are, its convenient ſmall ſize, its great ſenſibility, and its continuing longer in good order than any other. Fig. 14. repreſents a caſe to carry the above deſcribed electrometer in. This caſe is like a common toothpick caſe, except that it hath a piece of amber fixed on one extremity A, which may occaſionally ſerve to electrify the electrometer negatively: and on the other extremity it has a piece of ivory faſtened upon a piece of amber BC. This amber B C ſerves only to inſulate the ivory, which, when inſulated, and rubbed againſt woollen cloths, acquires a poſitive electricity, and is therefore uſeful to electrify the electrometer poſitively.”

From this very full explanation of the methods by which the electric fluid can be procured from the atmoſphere itſelf, from rain and vapour, at all times, it is impoſſible to doubt of the truth of the firſt poſition on which Dr Franklin's theory depends, viz. that “ all “ terreſtrial ſubſtances, as well as the atmoſphere which “ ſurrounds the earth, are filled with electric fluid.”

2. The ſecond poſition requiſite for eſtabliſhing Dr Franklin's theory is, “ That glaſs and other electric “ ſubſtances, tho' they contain a great deal of electric “ matter, are nevertheleſs *impermeable* by it.”—This aſſertion evidently has a contradictory appearance. It is very difficult, if not impoſſible to conceive, that any ſubſtance can be full of a fluid, and yet impermeable by that fluid; eſpecially when we continually talk of putting in an additional quantity into one ſide and taking out of the other. Nay, what is ſtill more extraordinary, the thinner the glaſs is, *i. e.* the *leſs* quantity of electric matter it can contain, the *more* we are able to put into it; for the thinner a glaſs is, the greater charge it can receive.

72
Arguments for the impermeability of glaſs refuted.

The chief arguments for the impermeability of glaſs by the electric fluid are drawn from the phenomena of the Leyden phial. It is indeed very plain, that there is in that caſe an expulſion of fire from the outſide at the ſame time that it is thrown upon the inſide. This appears from numberleſs experiments, but is moſt readily obſervable in the following. Let a coated phial be ſet upon an inſulating ſtand, and the knob of another phial be brought near the coating of the firſt. As ſoon then as the electric ſparks are diſcharged from the prime conductor to the knob of the firſt bottle, an equal number will be obſerved to proceed from the coating of the firſt to the knob of the ſecond. This is very remarkable, and an unphiloſophical obſerver will ſcarce ever fail to conclude, that the fire runs directly through the ſubſtance of the glaſs. Dr Franklin, however, concludes that it does not, becauſe there is found a very great accumulation of electricity on the inſide of the glaſs, which diſcovers itſelf by a violent flaſh and exploſion when a communication is made between the outſide and inſide coatings. But it muſt be obſerved, that there is here no other reaſon for concluding the glaſs to be impermeable, except that we *ſuppoſe* the electric matter to be *accumulated* on one ſide of the glaſs, and *deficient* on the other. If this ſuppoſition therefore cannot be proved, the evidence of ſenſe, which indeed is very ſtrong in favour of the permeability, muſt undoubtedly preponderate. It is ſaid indeed, that if the glaſs was permeable by the electric matter, a phial would be diſcharged immediately after being charged, or rather could never be charged at all; becauſe the matter would no ſooner be thrown upon one ſide, than it would fly off from the other. This ſuppoſition, however, depends entirely upon the abovementioned one, namely, that in bodies *poſitively* electrified there is an *accumulation*, and in ſuch as are *negatively* electrified there is a *deficiency* of fluid; which, never can be proved.

Another argument againſt the permeability of glaſs and other electrics is, that coated phials, it is ſaid, ſtanding upon electric ſubſtances, cannot be charged.—This, however, ſeems to be very much exaggerated. A phial, though ever ſo perfectly inſulated, will always receive a charge from a machine that acts very powerfully.—Nay, it is certain, that though a phial is placed in ſuch a manner, that both its knob and outſide coating are in contact with the prime conductor, it will ſtill receive a charge; much leſs indeed in this caſe than in any other, but ſtill the ſhock will be perceptible.

In 1759, Mr Wilſon read a paper before the Royal

Society, in which the permeability of glaſs by the electric fluid was aſſerted. The experiments from which he deduced this concluſion, were the following.—He took a very large pane of glaſs, a little warmed; and holding it upright by one edge, while the oppoſite edge reſted upon wax, he rubbed the middle part of the ſurface with his finger, and found both ſides electrified *plus*. He accounted for this from the electrical fluid paſſing through the glaſs from his finger to the oppoſite ſide. But here Dr Prieſtley obſerves, that on Franklin's principles it ought to be ſo. If one ſide be rubbed by the finger, it acquires from it ſome electrical fluid. This being ſpread on the glaſs as far as the rubbing extended, repels an equal quantity of that contained in the other ſide of the glaſs, and drives it out on that ſide, where it ſtands as an atmoſphere, ſo that both ſides are found poſitively electrified. Mr Wilſon alſo tried another experiment, which ſeemed more deciſive than the former: Having by him a pane of glaſs, one ſide of which was rough and the other ſmooth, he rubbed it ſlightly on one ſide; upon doing which, both ſides were electrified *minus*.—This alſo Dr Prieſtley attempts to reconcile with Franklin's hypotheſis. "As the electric fluid, contained in the glaſs, ſays he, is kept equal in both ſides by the common repulſion; if the quantity in one ſide is diminiſhed, the fluid in the other ſide, being leſs repelled, retires *inward*, and leaves that ſurface alſo *minus*." But here it is impoſſible to avoid obſerving, that Dr Prieſtley's own words, in the ſtrongeſt manner, militate againſt the doctrine he means to eſtabliſh. The quantity of fluid in one ſide being diminiſhed, that on the other, he ſays, *retires inward:* but into what does it retire? If into the ſubſtance of the glaſs, then the glaſs is undoubtedly permeable by it; and this is the very thing which Dr Prieſtley argues againſt.

73
The electric fluid cannot be proved repulſive of itſelf.

III. "The electric matter violently repells itſelf, and attracts all other matter."—The proofs of this poſition are chiefly derived from the following experiment, and others of a ſimilar kind.—Let a ſmooth piece of metal be inſulated, and bring an excited glaſs tube near one end of it. A ſpark of poſitive electricity will be obtained from the other end; after which, if the tube is ſuddenly removed, the metal becomes electrified negatively. Here, then, it is ſaid, is a plain repulſion of one part of the electric fluid by another. That contained in the tube repels the fluid contained in the neareſt end of the metal; of conſequence it is accumulated in the other end, and when the tube is removed, the metal is found to be deprived of part of its natural quantity of electricity, or is electrified negatively.—On ſuch experiments as this, however, it is obvious to remark, that we ought firſt to prove that poſitive electricity conſiſts in an *accumulation*, and negative electricity in a *deficiency*, of the electric fluid. But while this is only *ſuppoſed*, it is impoſſible that any proofs drawn from the ſuppoſition can be concluſive.

74
Beccaria's hypotheſis concerning excitation.

IV. "By the excitation of an electric, the equilibrium of the fluid contained in it is broken, and one part is overloaded with electricity, while the other contains too little." This poſition is entirely hypothetical. No electrician hath yet explained, in a ſatisfactory manner, how the fluid is procured by the excitation of glaſs or any other electric ſubſtance. Dr Prieſtley, inſtead of giving an explanation, propoſes ſeveral queries concerning it. Mr Cavallo tells us, that the **act** of excitation *pumps* as it were the electric fluid from the rubber, and conſequently from the earth. He adds, "By what mechaniſm one body extracts the electric fluid from another, is not yet known. The celebrated Father Beccaria ſuppoſes that the action of rubbing increaſeth the capacity of the electric, *i. e.* renders that part of the electric which is actually under the rubber, capable of containing a greater quantity of electric fluid: hence it receives from the rubber an additional ſhare of fluid, which is manifeſted upon the ſurface of the electric, when that ſurface is come out from the rubber; in which ſtate it loſes, or, as it were, contracts its capacity. Signior Beccaria's experiment to prove this ſuppoſition is the following. He cauſed a glaſs plate to be rubbed by a rubber applied on one ſide of the plate, while it was turning vertically; and holding at the ſame time a linen thread on the other ſide of the plate juſt oppoſite to the rubber, he obſerved that the thread was not attracted by that part of the glaſs which correſponded to the rubber, but by that which was oppoſite to the ſurface of the glaſs that had juſt come out from the rubber; which ſhews, that the fluid acquired by the glaſs plate did not manifeſt its power until the ſurface of the glaſs was come out from the rubber."—But from this experiment it ſeems impoſſible to draw any concluſion concerning the capacity of glaſs either one way or other. It is evident, therefore, that whatever parts of Dr Franklin's hypotheſis reſt on this ſuppoſition concerning excitation, are entirely void of evidence.

75
Whether the electric fluid pervades the ſubſtance of conductors.

V. "Conducting bodies are permeable by the electric fluid through the whole of their ſubſtance, and do not conduct it merely over their ſurface."—The proof moſt commonly adduced in favour of this poſition, is the following experiment. Take a wire of any kind of metal, and cover part of it with ſome electric ſubſtance, as roſin, ſealing-wax, &c. then diſcharge a jar through it, and it will be found that it conducts as well with as without the electric coating. This, ſays Mr Cavallo, proves that the electric matter paſſes through the ſubſtance of the metal, and not over its ſurface. A wire, adds he, continued through a vacuum, is alſo a convincing proof of the truth of this aſſertion.—Even here, however, the proof, if impartially conſidered, will be found very defective. It is a fact agreed upon by all philoſophers, that bodies which to us are apparently in contact, do neverthleſs require a very conſiderable degree of force to make them actually touch one another. Dr Prieſtley found that a weight of ſix pounds was neceſſary to preſs 20 ſhillings into cloſe contact, when lying upon one another on a table. A much greater weight was neceſſary to bring the links of a chain into contact with each other. It cannot be at all incredible, therefore, that a wire, though covered with ſealing-wax or roſin, ſhould ſtill remain at ſome little diſtance from the ſubſtance which covers it. The following experiments of Dr Prieſtley alſo ſeem to be much in favour of the ſuppoſition that the electric fluid paſſes chiefly over the ſurface of conducting ſubſtances.

"From the very firſt uſe of my battery, (ſays he,) I had obſerved a very black ſmoke or duſt to ariſe on every diſcharge, even when no wire was melted; and the braſs chain I made uſe of was of a conſiderable thickneſs. I obſerved, that a piece of white paper, on which lay the chain I was uſing to make the diſcharge, was marked with a black ſtain, as if it had been burnt, wherever it had touched it. I neglected the experiment, till, ſome time after, obſerving a very ſtriking appearance of the ſame kind, I was determined to attend to the circumſtances of it a little more particularly. I made my chain very clean, and wrapping it in white paper, I made a diſcharge of about 40 ſquare feet through it, and found the ſtain wherever it had touched the paper. Some time after I wrapped the paper, in the ſame manner, round a piece of braſs wire; but, making a diſcharge through it, ſaw no ſtain. To aſcertain whether this appearance depended upon the diſcontinuity of the metallic circuit, I ſtretched the chain with a conſiderable weight, and found the paper on which it lay as the ſhock paſſed through it, hardly marked at all. Finding that it depended upon the diſcontinuity, I laid the chain upon white paper, making each extremity faſt with pins ſtuck through the links; and when I had made the diſcharge, obſerved that the black ſtains were directly oppoſite to the body of the wire that formed the chain, and not to the intervals, as I had ſometimes ſuſpected. A chain five feet four inches long, which weighed one ounce, ſeventeen penny-weights, four grains, loſt exactly half a grain after each diſcharge.

76 A chain ſhortened by the electric ſhock.

“ In making the mark above-mentioned, I once happened to lay the chain ſo as to make it return at a ſharp angle, in order to impreſs the form of a letter upon the paper; and obſerved, that, on the diſcharge, the part of the chain that had been doubled was diſplaced, and pulled about two inches towards the reſt of the chain. At this I was ſurpriſed, as I thought it lay ſo, that it could not ſlide by its own weight. Upon this I repeated the experiment with more accuracy. I ſtretched the whole chain along a table, laying it double all the way, and making it return by a very ſharp angle. The conſequence always was, that the chain was ſhortened about two inches, and ſometimes more, as if a ſudden pull had been given to it by both the ends.---Suſpecting that the black ſmoke which roſe at every diſcharge, might come, not from the chain, but from the paper, or the table on which it lay, and which was probably burnt by the contact of it, I let the chain hang freely in the air; but, upon making the diſcharge, I obſerved the ſame groſs black ſmoke that had before riſen from the paper or the table. Fig. 4. Plate CI. repreſents the ſpots made upon the paper by a chain laid over it. The breadth of the ſpots is about the mean thickneſs of the wire of the chain, and *a b* marks the place to which that part of the chain which returned was thrown back by the diſcharge.

“ Being willing to try what would be the effect of laying the chain in contact with non-conductors, I dipped it in melted roſin till it had got a coating of conſiderable thickneſs. When it was quite ſtiff, I laid it carefully, without bending, upon white paper, and made the diſcharge through it. The roſin was inſtantly diſperſed from all the outſide of the chain, it being left as clean as if none had ever been put on. That with which the holes in the chain had been filled, having been impelled in almoſt all directions, was beaten to powder; which, however, hung together, but was perfectly opaque; whereas it had been quite tranſparent before this ſtroke. I next laid the chain upon a piece of glaſs, which was marked in the moſt beautiful manner wherever the chain had touched it; every ſpot the width and colour of the link. The metal might be ſcraped off the glaſs at the outſide of the marks; but, in the middle part, it was forced within the pores of the glaſs. On the outſide of this metallic tinge was the black duſt, which was eaſily wiped off.

From theſe experiments it would ſeem, that the electrical flaſh had paſſed over the ſurface of the chain rather than through its ſubſtance; ſeeing it threw off the roſin with ſuch extreme violence. The ſame thing appears from the manner in which electricity generally acts, which is not according to the ſolid contents of any ſubſtance, but according to the dimenſions of its ſurface. It is not to be doubted, however, but that, where a great quantity of electric matter is made to paſs along a very ſmall wire, it will enter the ſubſtance of the metal. This appears from the poſſibility of melting wires by the force of electric batteries, and even totally diſſipating them into ſmall globules. To accompliſh this, it is only neceſſary to connect the hook communicating with the outſide coating of a battery, containing at leaſt 30 ſquare feet of coated ſurface, with a wire that is about one fiftieth part of an inch thick and about two feet long. The other end of it muſt be faſtened to one end of the diſcharging rod: this done, charge the battery; and then by bringing the diſcharging rod near its wires, ſend the exploſion through the ſmall wire, which by this means will be made red hot, and melted, ſo as to fall upon the floor in different glowing pieces. When a wire is melted in this manner, ſparks are frequently ſeen at a conſiderable diſtance from it, which are red hot particles of the metal, that, by the violence of the exploſion, are ſcattered in all directions. If the force of the battery is very great, the wire will be entirely diſperſed by the exploſion, ſo that none of it can be afterwards found.---If it is required to melt ſuch particles as cannot eaſily be drawn into wires, ores, for inſtance, or grain-gold, they may be ſet in a train upon a piece of wax: they are then to be put into the circuit, and an exploſion ſent through them, which, if ſufficiently ſtrong, will melt them as well as the wires. If a wire is ſtretched by weights, and a ſhock is ſent through it which renders it juſt red hot, the wire, after the exploſion, is found to be conſiderably lengthened.

77 Dr Franklin's hypotheſis concerning poſitive and negative electricity cannot be proved.

VI. The laſt poſition on which Dr Franklin's theory depends, and which indeed may be called the foundation of the whole, is, “ That poſitive electricity is an accumulation, or too great a quantity, of electric matter contained in a body; and negative electricity is when there is too little.” Of this, however, there is not one ſolid proof; and all attempts that have hitherto been made to prove it, are only arguing in a circle, or proving the thing by itſelf. Thus, for inſtance, a body electrified poſitively, attracts one that is electrified negatively; becauſe the firſt has too much, and the other too little, electric matter. But how do we know that one has too much and the other too little electricity? Becauſe they attract each other.---Again, it has been proved, that when a phial is electrified poſitively, there is as conſtant a ſtream of fire from the outſide coating, as there is from the conductor to the inſide coating. Therefore, it is ſaid, the outſide of the glaſs has too little, and the inſide too much, electricity. But how is this known to be the caſe? Becauſe glaſs is impermeable by the electric fluid. And how is glaſs known to be impermeable? Becauſe, in the above experiment, one ſide has too much, and the other too little, electricity.---Thus, in every inſtance, the arguments for Dr Franklin's hypotheſis return into themſelves, and no concluſion can be drawn from them. In the ſubſequent ſection, the nature of the electric fluid is particularly conſidered, where the improbability of its ever being accumulated in the ſubſtance of ſolid bodies will more plainly appear.

SECT. VI. *An Inquiry into the Nature of the Electric Fluid; with an Attempt to explain the principal Phenomena of Electricity, from the known laws by which other Fluids are obſerved to act upon one another.*

IN making this inquiry, or indeed any other, it is proper to take for granted as little as poſſible. No poſition ſhould be aſſumed as the baſis of any reaſoning whatever, except what has been proved by inconteſtable facts. In the preſent caſe, therefore, it is ſufficient to aſſume as a fact what hath been already proved by innumerable experiments, namely, That the air, the earth, and ſea, are all filled with electric fluid. The queſtion which moſt naturally ſuggeſts itſelf when this is once admitted, is, Whence hath the electric fluid come? is it eſſentially inherent in theſe bodies, or hath it come from without?---This cannot be reſolved, without conſidering the nature of the fluid itſelf, and whether it is analagous to any other which is more generally known.

§ 1. *Proofs of the Identity of the Electric Fluid and Elementary Fire or Light of the Sun.*

78
Gun-powder fired by the electric blaſt.

THE ſimilarity between the electric matter and fire, naturally ſuggeſted to the firſt obſervers, that it was no other than elementary fire, which pervaded all ſubſtances, as we have already mentioned. This, however, was objected to; and the principal objection was, that though the electric matter emitted light, and had the appearance of fire, it nevertheleſs wanted its moſt eſſential quality, namely, *burning*. In particular, the blaſt which comes from an electrified point, feels cold inſtead of being hot; and where great quantities of the fluid are forced with violence through certain ſubſtances, and thus ſet them on fire, it was thought that the fire might be occaſioned by the internal commotion excited among their ſmall particles. This objection, however, ſeems now to be totally removed. The diſpute concerning the preferable utility of pointed or knobbed conductors for ſecuring buildings from lightning, occaſioned the fitting up of a more magnificent apparatus than had ever appeared before. An immenſe conductor was conſtructed at the expence of the board of ordnance, and ſuſpended in the *Pantheon*. It conſiſted of a great number of drums covered with tin-foil, which formed a cylinder of above 155 feet in length, and more than 16 inches in diameter; and to this vaſt conductor were occaſionally added 4800 yards of wire. The electric blaſt from this machine fired gun-powder in the moſt unfavourable circumſtances that can be imagined, namely, when it was drawn off by a ſharp point, in which caſe it has generally leſs force than in any other. The method of doing this was as follows. Upon a ſtaff of baked wood a ſtem of braſs was fixed, which terminated in an iron point at the top. This point was put into the end of a ſmall tube of Indian paper, made ſomewhat in form of a cartridge, about an inch and a quarter long, and two tenths of an inch in diameter. When the cartridge was filled with common gun-powder, unbruiſed, a wire communicating with the earth was then faſtened to the bottom of the braſs ſtem. The charge in the great cylinder being continually kept up by the motion of the wheel, the top of the cartridge was brought very near the drums, ſo that it frequently even touched the tin-foil with which they were covered. In this ſituation a ſmall faint luminous ſtream was frequently obſerved between the top of the cartridge and the metal. Sometimes this ſtream would ſet fire to the gun-powder the moment it was applied; at others, it would require half a minute or more before it took effect. But this difference in time was ſuppoſed to be owing to ſome ſmall degree of moiſture in the powder or the paper, which was always unfavourable to the experiment. Tinder was fired much more readily."

79
Action of the electric matter and light compared.

As it therefore appears, that the electric fluid, when it moves through bodies either with great rapidity, or in very great quantity, will ſet them on fire, it ſeems ſcarce diſputable, that this fluid is the ſame with the element of fire. For further proofs of this opinion, which is now adopted by ſome very eminent philoſophers, ſee the articles FIRE and HEAT.—This being once admitted, the ſource from whence the electric fluid is derived into the earth and atmoſphere, muſt be exceedingly evident, being no other than the ſun himſelf. The vaſt quantity of light which continually comes from him to the earth muſt of neceſſity be abſorbed by that opaque body, at leaſt in great part. It is impoſſible it can remain there, becauſe there is a perpetual ſucceſſion of new quantities coming from the ſun. It muſt be obſerved, however, that as this fluid receives a great number of different directions after once it enters the earth, it cannot appear in its natural form of fire or light, till it receives a new motion ſimilar to what it had when proceeding from the ſun. The ſolar light only burns, or produces heat, when diverging from a centre, or converging towards one. The heat is always greateſt at the central point; and even there, no heat is produced except where the light paſſes through a reſiſting medium. In thoſe caſes likewiſe the electric fluid burns. When diſcharged with violence from an electrified bottle, it flies out on all ſides, and then will fire gun-powder or other combuſtible ſubſtances. The ſame thing it will do when converging towards a point, if in ſufficient quantity, as was obſerved in the experiment with the large conductor abovementioned. But when the electric fluid neither meets with any conſiderable reſiſtance, diverges from a centre, nor converges towards one, it is almoſt always inviſible, and without heat. A moſt remarkable proof of this we have, even when a vaſt quantity of electric matter is forced to go through a very ſmall wire. Dr Prieſtley tells us he had once an opportunity of obſerving what part of the conductors which form an electric circuit, are moſt affected by the exploſion. Upon diſcharging a battery of 51 ſquare feet thro' an iron wire nine inches long, the whole of it was glowing hot, and continued ſo for ſome ſeconds. The middle part grew cool firſt, while both the extremities were ſenſibly red. When the wire was afterwards examined, both the extremities were found quite melted ; an inch or two of the part next to them was extremely brittle, and crumbled into ſmall pieces on being handled ; while the middle part remained pretty firm, but had quite loſt its poliſh, ſo that it looked darker than before. This is preciſely what would have happened, had both ends been put into a common fire. We are very ſure, that the ſame quantity of electric matter paſſed through the middle of the wire, that entered one end of it and went out at the other. Why then did it not produce the ſame degree of heat in the middle that it did at each end ? The reaſon is plain : At one end it was in a ſtate of *convergence* from the battery to the point of the wire ; at the other, it was in a ſtate of *divergence* from the point of the wire to the battery. At the points, therefore, an intenſe heat was produced ; but in the middle, where the fluid neither converged nor diverged, but moved forwards in a parallel direction, the heat was much leſs. Now we know that this is the caſe with the ſolar light itſelf. At the focus of a burning-glaſs there is an intenſe heat both where the convergence ends and the divergence begins. But where this divergence conſiderably ceaſes, and the motion of the light becomes more parallel, the heat is vaſtly diminiſhed. The caſe is the ſame with a common fire, and with all burning bodies ; for heat never acts but from a centre, and is always greateſt at the central point. It is true, that we can never produce electric fire without at the ſame time producing a violent ſhock exceedingly different from the *burning* of common fire. But the reaſon of this is, that we cannot produce a divergence in a ſtream of electric matter, without at the ſame time giving it ſuch a motion in ſome other direction, that its impetus becomes very perceptible. If it was in our power to make the flaſh produced by an electric bottle keep its place, we cannot ſuppoſe that any ſhock, or other ſenſation than heat, would be felt. But there is no poſſibility of hindering it from flying with prodigious celerity from one ſide of the bottle to the other. Therefore, as it is neither in a ſtate of divergence or convergence, except where it comes out from and enters into the bottle, no ſenſation is perceived except what ariſes from its change of place ; and hence it is ſaid, that the electric matter hath no heat.

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§ 2. *The Identity of Electric Matter and Light farther conſidered; with ſome poſitive Proofs, that electric Subſtances are actually penetrated by the electric Fluid.*

80
Objection concerning the impenetrability of glaſs anſwered.

THE only objection of any ſtrength which can ariſe to the identity of the electric fluid and light is, the ſurpriſing eaſe with which the latter penetrates glaſs, and the ſeeming ſtop which is put to the motions of the former when a piece of glaſs or any other electric ſubſtance is preſented to it. Here, however, it muſt be obſerved, that light, as proceeding from a luminous body, muſt be regulated by very different laws from light which is abſorbed by opaque bodies, and conſequently ſubjected to motions quite different from what it originally had. Water, the only fluid with which we are very well acquainted, (for all others we know are regulated by the ſame laws), is capable of two very different motions. The one is a rectilineal one, by which great quantities of it run from one place to another. The other is not ſo eaſily explained. It may, however, be very readily obſerved, by throwing a ſmall ſtone into a pool of water. A great number of concentric circles will be propagated from the place where the ſtone fell, as from a centre, which will gradually grow larger and larger. If another ſtone is thrown in at ſome diſtance, ſimilar circles will proceed from the place where it fell. Theſe will meet with the former, and croſs them without interfering with each other in the leaſt. It is certain, however, that two ſtreams of water ruſhing oppoſite to one another, would ſhatter and deſtroy each other. If, therefore, there is a difference in the motion of the electric fluid when it burns, and when it does not, (which there certainly is), we may eaſily ſuppoſe it poſſible, that glaſs ſhould obſtruct one kind of motion and not another: In which caſe, the glaſs would ſeem to be permeable by the fluid when manifeſting itſelf by the firſt kind of motion, and not ſo when it manifeſts itſelf by the other.

81
Surpriſing experiments concerning the tranſparency of bodies.

It hath commonly been thought, that the tranſparency of bodies depends upon the rectilinear direction of their pores, and opacity upon the ſituation of them in ſome other direction. Electrical experiments, however, have ſhewn that this is not the caſe. Sealing-wax and pitch are as opaque bodies as we are acquainted with ; yet in Mr Hawkſbee's experiments mentioned, n° 4. theſe ſubſtances were both rendered tranſparent by the action of the electric fluid. Theſe experiments are confirmed by ſome others ſtill more ſurpriſing, mentioned by Dr Prieſtley. One was made by S. Beccaria. He diſcharged an electric ſhock through ſome braſs duſt ſprinkled between two plates of ſealing-wax. The whole was perfectly luminous and tranſparent. The moſt extraordinary experiment, however, was made by Dr Prieſtley himſelf, of which he gives the following account. "I laid a chain in contact with the outſide of a jar lightly on my finger, and ſometimes kept at it a ſmall diſtance by means of a thin piece of glaſs ; and, if I made the diſcharge at the diſtance of about three inches, the electric fire was viſible on the ſurface of the finger, giving it a ſudden concuſſion, which ſeemed to make it vibrate to the very bone ; and when it happened to paſs on that ſide of the finger which was oppoſite to the eye, the whole ſeemed perfectly *tranſparent* in the dark."

82
Conſequences from them.

Experiments of this kind, though they have not hitherto been purſued by any electrician, ſeem to be more worthy of notice than almoſt all others. One conſequence which may be derived from them is, that there is in bodies, whether electric or non-electric, a certain ſubtile medium, on the motion of which, tranſparency depends. That is, when the medium is at reſt, the body is opaque ; but when ſet in motion, it becomes tranſparent. This motion, we ſee, may be given in two different ways. One is by ſimple electrification *in vacuo*, according to Mr Haukeſbee's experiments. The other is, by ſending the flaſh of an electrified bottle over their ſurface. In Dr Prieſtley's experiment, he could determine the motion to be of the vibratory kind ; and hence we may eaſily conclude, that ſome bodies may be conſtructed in ſuch a manner,

that

Theory.

that they are capable of tranſmitting the vibrations of this fluid, but not any other kind of motion. Such kinds of bodies will be naturally tranſparent: but others, whoſe particles are diſpoſed in ſuch a manner that the vibrations cannot be propagated through them without conſiderable violence, are naturally opaque. The queſtion then only is, What is this ſubtile medium, the vibrations of which occaſion tranſparency? It is ſcarce poſſible to anſwer this queſtion in another manner than by ſaying, that it is the electric fluid. That it is this fluid which gives the power to electric ſubſtances, has never been denied. That the motion of this fluid along the ſurfaces of bodies throws another fluid within them into vibrations, is alſo evident from the experiments above-mentioned. All bodies are confeſſed to be full of electric matter: therefore, if a quantity of the ſame matter paſſes over the ſurface of any body, it muſt affect what is within its ſubſtance with a motion of ſome kind or other; becauſe it affects that which lies on the outſide, and this cannot fail to affect all the reſt.—This motion Dr Prieſtley's experiment determines to be of the vibratory or tremulous kind; and, indeed, it is natural to think it ſhould be ſo. The vibrations of the electrical fluid, therefore, conduct light through opaque bodies. But whatever fluid is conducted by the vibration of another, muſt itſelf alſo vibrate while it is ſo conducted. Light, therefore, vibrates when emitted from luminous bodies. In the preſent caſe, theſe vibrations are originally occaſioned by the electric flaſh. They are conducted through opaque bodies by the vibrations of the electric fluid. The air is alſo full of the ſame fluid. The air is naturally tranſparent; but we have ſeen that tranſparency conſiſts only in the eaſy tranſmiſſion of a vibratory motion of the electric fluid. The light, therefore, is perpetually conducted by means of the vibrations of this fluid: therefore, the vibrations of the electric fluid and light are the ſame; for no two fluids are always capable of ſetting one another in motion preciſely in the ſame manner, unleſs their nature is in all reſpects exactly the ſame.

83
Light proved to be a vibration of the electric fluid.

Theſe experiments ſeem in the ſtrongeſt manner to prove the identity of the electric fluid and light, and that both are tranſmitted through electric as well as other ſubſtances. The reaſon, therefore, of the ſeeming ſtop, which is obſerved in our electrical operations by the intervention of glaſs, is, that in all artificial electricity, the fluid has a very conſiderable progreſſive motion, which cannot be eaſily propagated through the ſolid ſubſtance of any body, eſpecially where there is a pretty ſtrong reſiſtance on the other ſide; which ſhall afterwards be ſhewn to be the caſe with this fluid when paſſing through electric ſubſtances.

§ 3. *Of the Paſſage of the Electric Fluid over the Surface, and through the Subſtance, of different Bodies.*

84
Dr Prieſtley's experiments with ice.

Dr Prieſtley hath made many very curious experiments concerning the diſcharging of electric ſhocks over the ſurface of different bodies; and finds, that by this means a battery may be made to diſcharge itſelf at a much greater diſtance than it would do if ſent directly through the air. The experiments were begun with ice; and he firſt accidentally diſcovered, that, when the ſhock of a common jar was diſcharged on a plate of ice, it would ſometimes run over the ſurface and ſtrike the chain directly on the other ſide. With a ſingle jar, however, the diſtance was not much greater than what it would have paſſed over in the uſual way; but, with a battery, it exceeded the uſual diſtance in a very great degree.—Endeavouring to make a circular ſpot, ſuch as he had formerly made on metals, upon a piece of raw fleſh, he took a leg of mutton, and laying the chain that communicated with the outſide of the battery over the ſhank, he took the exploſion on the outward membrane, about ſeven inches from the chain; but was greatly ſurpriſed to obſerve the electric fire not to enter the fleſh, but to paſs in a body along the ſurface of it to come to the chain. Thinking that this might be occaſioned by the fatty membrane on which the exploſion was made, he again laid the chain in the ſame manner over the ſhank, and took the exploſion upon the muſcular fibres, where they had been cut off from the reſt of the body; but ſtill the fire avoided entering the fleſh, made a circuit of near an inch round the edge of the joint, and paſſed along the ſurface to come to the chain as before, though the diſtance was near 11 inches. Imagining that this effect was promoted by the chain lying lightly on the ſurface of the fleſh, and therefore not actually in contact with it, he took another exploſion upon the hook of the chain, which was thruſt into the fleſh. On this the fire entered the mutton; and as he held it in his hands, both his arms were violently ſhocked up to his ſhoulders.

Theory.

85
With raw fleſh.

The Doctor next determined to try the effect of different conducting ſubſtances in the ſame manner; and of theſe water was the moſt obvious. "Next day, ſays he, I laid a braſs rod communicating with the outſide of the battery, very near the ſurface of a quantity of water, (to reſemble the chain lying upon the ſurface of the fleſh, without being in contact with it), and, by means of another rod furniſhed with knobs, made a diſcharge on the ſurface of the water, at the diſtance of ſeveral inches from any part of the rod; when the electric fire ſtruck down to the water, and, without entering it, paſſed viſibly over its ſurface till it arrived at that part of the rod which was neareſt the water, and the exploſion was exceedingly loud. If the diſtance at which I made the diſcharge exceeded ſeven or eight inches, the electric fire entered the water, making a beautiful ſtar upon its ſurface, and yielding a very dull ſound.—When I firſt made this experiment of the electric flaſh paſſing over the ſurface of water, I thought it neceſſary, that neither the piece of metal communicating with the outſide, nor that communicating with the inſide, of the jars, ſhould touch the water immediately before the diſcharge. But I afterwards found, that the experiment would anſwer, though either, or even both of them, were dipped in the water: for, in this caſe, the exploſion would ſtill prefer the ſurface to the water itſelf, if the diſtance was not very great; and would even paſs at a greater diſtance along the ſurface, when there was a nearer paſſage from one rod to the other in the water."

85
With water.

He afterwards tried to paſs the electric flaſh over the ſurfaces of a great number of different bodies, but found it impoſſible with a great number of them. He therefore imagined, that this property of conducting a ſhock over its ſurface was peculiar to water and raw fleſh. It was found, however, that the flaſh paſſed over the ſurface of a touch-ſtone, and likewiſe over a piece

86
With many other bodies.

ELECTRICITY.

Plate XCIX.

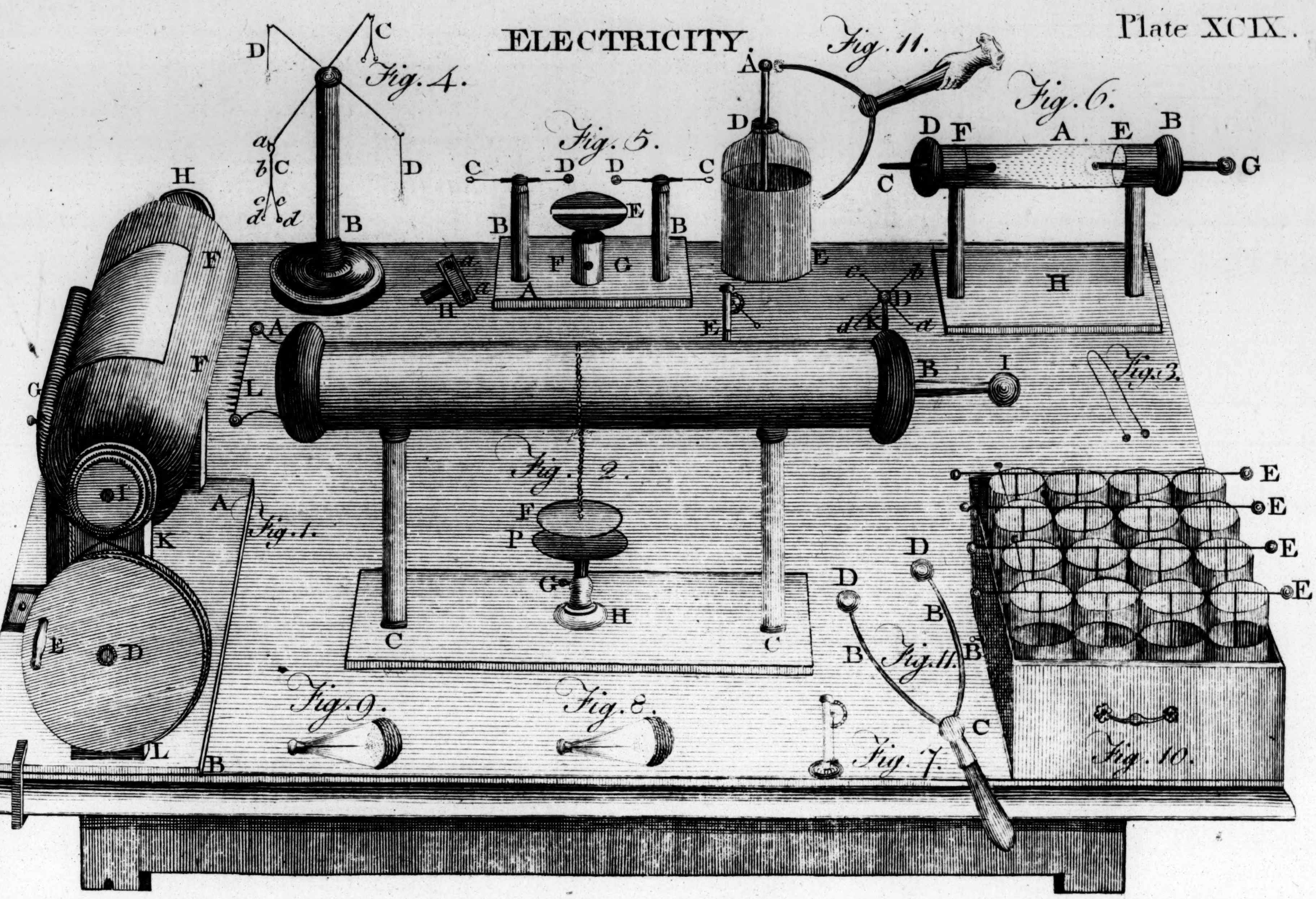
Fig. 1.
Fig. 2.
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Fig. 11.
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Fig. 12.

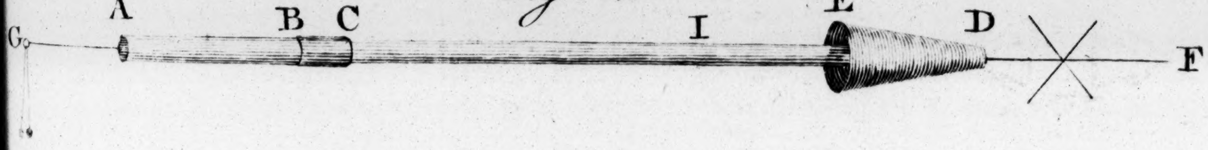


Fig. 13.

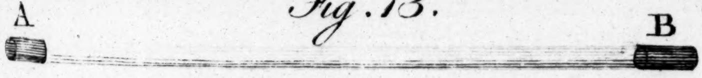


Fig. 14.

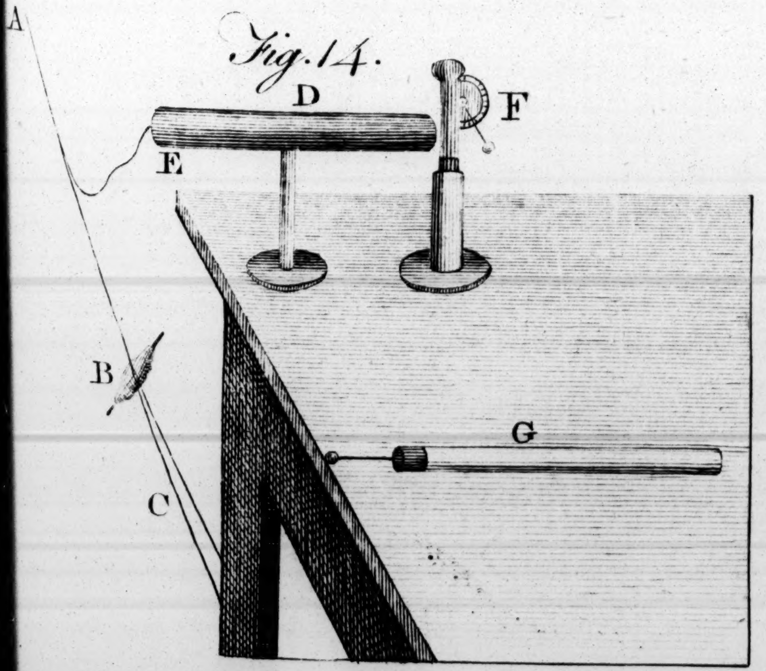


Fig. 15.

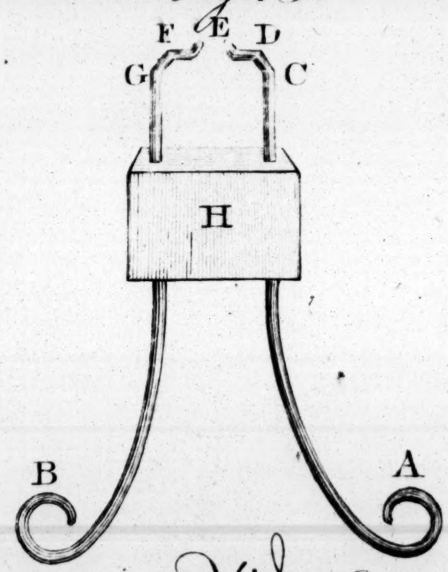


Fig. 16.

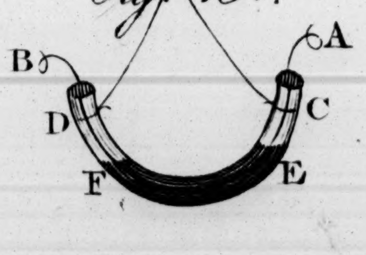
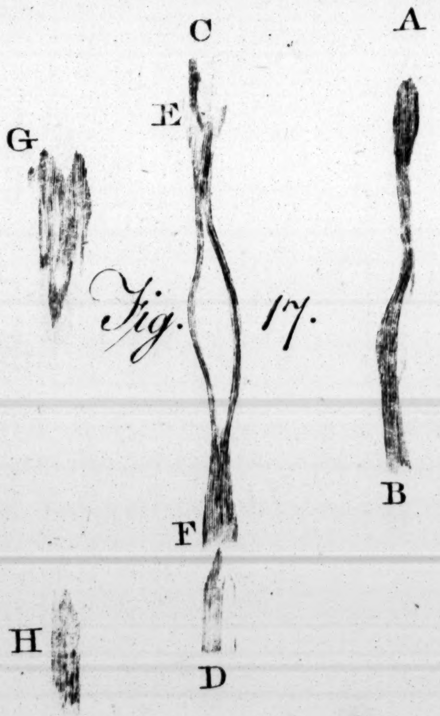


Fig. 17.



A. Bell Sculp^t.

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ELECTRICITY.

Plate C.

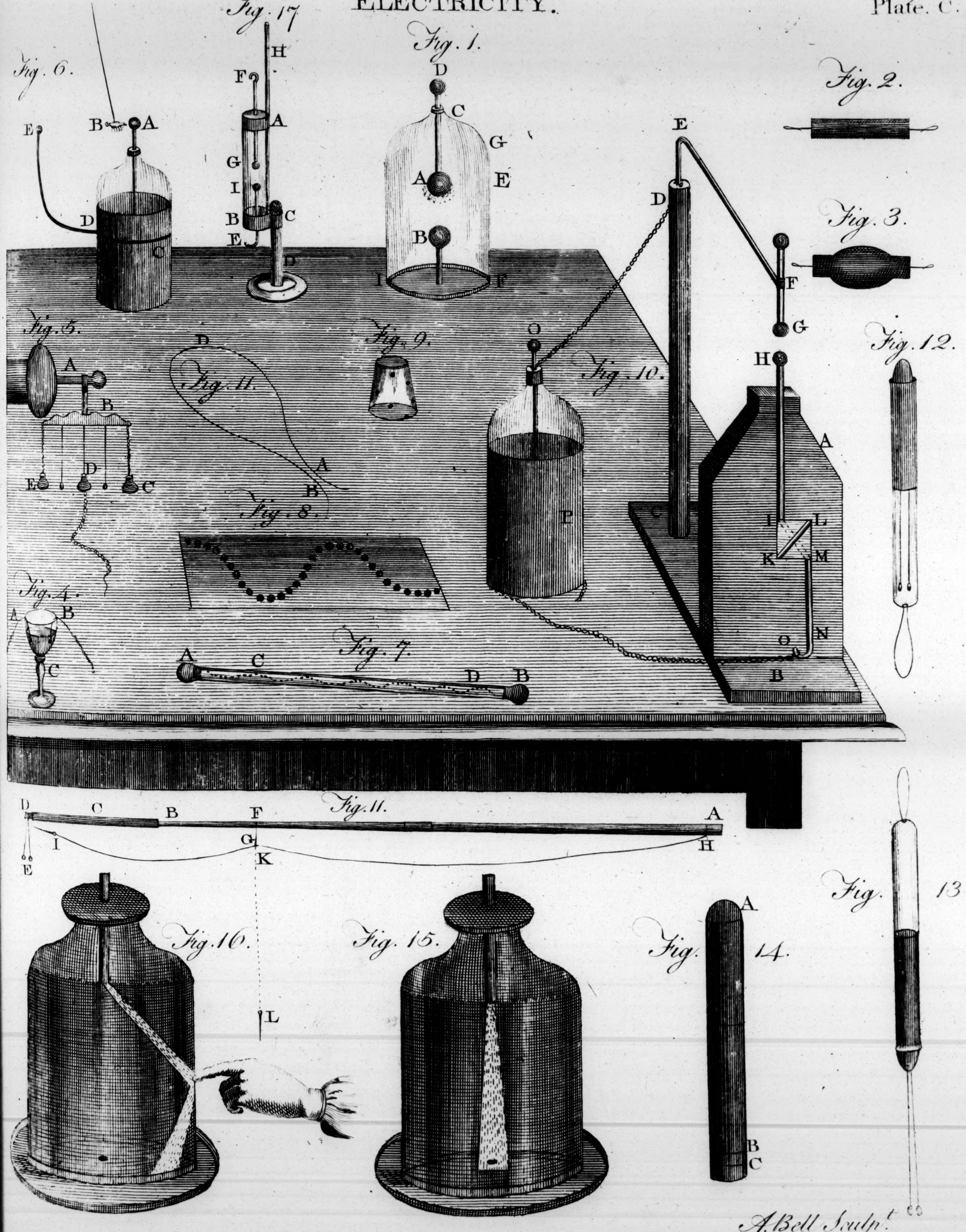
Fig. 17
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Fig. 16.
Fig. 15.
Fig. 14.
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Fig. 13.

A. Bell Sculpt.

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piece of the beſt kind of iron ore, exceedingly ſmooth on ſome of its ſides. The piece was about an inch thick, and three inches in its other dimenſions. The full charge of a jar of three ſquare feet would not enter it. The exploſion paſſed over the ſurface of oil of vitriol with a dull ſound and a red colour; but in all other caſes, if it paſſed at all, it was in a bright flame, and with a report peculiarly loud. It paſſed over the ſurface of the moſt highly rectified ſpirit of wine without firing it; but when too great a diſtance was taken, the electric fire entered the ſpirit, and the whole was in a blaze in a moment.

This was the caſe when ſuch ſubſtances were employed as are but indifferent conductors of electricity; raw fleſh, for inſtance, water, &c. When good conductors were uſed, ſuch as charcoal of different kinds, no remarkable appearances were produced. So far was the ſhock from paſſing viſibly over the ſurface of any metal, that, if the diſtance through the air, in order to a paſſage through the metal, was ever ſo little nearer than the diſtance between the two ſurfaces, it never failed to enter the metal; ſo that its entering the ſurface of the metal, and its coming out again, ſeemed to be made without obſtruction. If as much water was laid on a ſmooth piece of braſs as could lie upon it, it would not go over the ſurface of the water, but always ſtruck through the water into the metal. But if the metal lay at any conſiderable depth under the water, it would prefer the ſurface. It even paſſed over three or four inches of the ſurface of water as it was boiling in a braſs pot, amidſt the ſteam and bubbles, which ſeemed to be no hindrance to it.—Animal fluids, however, of all kinds, ſeemed peculiarly to favour this paſſage of the electric matter over their ſurface; and the report of theſe exploſions was manifeſtly louder than when water was uſed. In all caſes of this kind, the report was conſiderably louder than when the diſcharge was made in the common way. The exploſions were obſerved by perſons out of the houſe, and in a neighbouring houſe, very much to reſemble the ſmart cracking of a whip. "But, (ſays Dr Prieſtley,) the ſound made by theſe exploſions, though by far the loudeſt that ever I heard of the kind, fell much ſhort of the report made by a ſingle jar, of no very great ſize, of Mr Rackſtrow's; who ſays, that it was as loud as that of a piſtol." He alſo obſerves, that when the electrical exploſion does not paſs over the ſurface of the water, but enters it, a regular ſtar is made upon the ſurface, conſiſting of ten or a dozen rays: and what is very remarkable, thoſe rays which ſtretch towards the braſs rod that communicates with the outſide of the battery are always longer than the reſt; and if the exploſion is made at ſuch a diſtance as to be very near taking the ſurface, thoſe rays will be four or five times longer than the reſt, and a line bounding the whole appearance will be an ellipſis, one of whoſe foci is perpendicularly under the braſs knob with which the diſcharge is made.

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When an electric battery is diſcharged upon ſmooth pieces of metal, the effects are very different from any of thoſe we have yet mentioned. Dr Prieſtley having conſtructed ſome large batteries, determined to try what would be the effects of a very great electric power diſcharged upon metals and other ſubſtances; and, in the courſe of his random experiments, he made the following diſcoveries. "June 13, 1766, (ſays he), after having diſcharged a battery of about 40 ſquare feet with a ſmooth braſs knob, I accidentally obſerved upon it a pretty large circular ſpot, the center of which ſeemed to be ſuperficially melted, in a great number of dots; larger near the centre, and ſmaller at a diſtance from it. Beyond this ſpot was a circle of black duſt which was eaſily wiped off: but what I was moſt ſtruck with was, that after an interruption of melted places, there was an entire and exact circle of ſhining dots, conſiſting of places ſuperficially melted like thoſe at the centre. The appearance of the whole, excluſive of the black duſt, is repreſented Plate CI. fig. 1. n° 1.

"June 14. I took the ſpot upon ſmooth pieces of lead and ſilver. It was in both caſes like that on the braſs knob; only the central ſpot on the ſilver conſiſted of dots diſpoſed with the utmoſt exactneſs, like radii from the centre of a circle, each of which terminated a little ſhort of the external circle. I took the circular ſpot upon poliſhed pieces of ſeveral metals with the charge of the ſame battery, and obſerved that the cavities in ſome of them were deeper than in others; as I thought in the following order, beginning with the deepeſt, tin, lead, braſs, gold, ſteel, iron, copper, ſilver.—I will not be poſitive as to the order of ſome of the metals; but ſilver was evidently not affected a fourth part ſo much as gold, and much leſs than any of the others. The circles were marked as plain, but the impreſſion was more ſuperficial.

"I alſo made the exploſion between a piece of lead juſt ſolid after melting, and another ſmooth piece that I had kept a conſiderable time. The piece of freſh lead was melted more than the other, but there was no other difference between them. The ſemimetals, as biſmuth and zinc, received the ſame impreſſion as the proper metals; being melted nearly as much as iron. I made three diſcharges between a piece of highly poliſhed ſteel and a piece of very ſmmoth iron, and in all caſes thought the ſteel was more deeply melted than the iron.

"Preſently after I had obſerved the ſingle circle, I imagined, that, whatever was the cauſe of the appearance, it was not improbable but that two or more concentric circles might be procured, if a greater quantity of coated glaſs was uſed, or perhaps if the exploſion was received upon metals that were more eaſily fuſed than braſs. Accordingly, June 27, taking the moderate charge of a battery conſiſting of about 38 ſquare feet, upon a piece of tin, I firſt obſerved a ſecond outer circle, at the ſame diſtance from the firſt, as the firſt was from the central ſpot. It conſiſted of very fine points hardly viſible, except when held in an advantageous light; but the appearance of the whole was very beautiful, and was ſuch as is repreſented Plate CI. fig. 1. n° 2.

"Having hitherto found the circles the moſt diſtinct on metals that melt with the leaſt degree of heat, I ſoon after procured a piece of that compoſition which melts in boiling water; and having charged 60 ſquare feet of coated glaſs, I received the exploſion with it, and found three concentric circles; the outermoſt of which was not quite ſo far from the next to it, as that was from the innermoſt. All the ſpace within the firſt circle was melted; but the ſpace was very well defined, and by no means like a central ſpot, which in this caſe was quite obliterated. The appearance of theſe three concentric circles is repreſented Plate CI. fig. 1. n° 3. The diſtance at which the diſcharge was made occaſioned no difference in the diameter of theſe circular ſpots. When, by putting a drop of water upon the braſs rod communicating with the inſide of the battery, I made the diſcharge at the diſtance of two inches; the ſpot was juſt the ſame as if it had been received at the diſtance of half an inch, *i. e.* about a quarter of an inch in diameter. Attempting to ſend an electric ſhock over the ſurface of quickſilver or melted lead, I found that it would not paſs; though neither of the rods with which the diſcharge was made, touched the metals. A dark impreſſion was made on the ſurfaces of both the quickſilver and the lead of the uſual ſize of the circular ſpot; and remained very viſible notwithſtanding the ſtate of fuſion in which the metals were."

§ 4. *The Electric Fluid moves thro' the Subſtance of Electrics, though with difficulty. In moſt caſes, it paſſes over the Surface of good Conductors.*

THIS will appear from a conſideration of the phenomena abovementioned, and ſome others. The electric moſt univerſally preſent is *air.* That the fluid pervades its ſubſtance is evident to our eye-ſight; for if a pointed body is placed on the prime conductor, and at the ſame time the cylinder is briſkly turned, a continual ſtream of blue fire will be obſerved to iſſue from the point. This is undoubtedly the fluid itſelf made viſible by the reſiſtance it meets with from the air. That the electric fluid in this caſe pervades the air to a conſiderable diſtance, is alſo evident from the different methods by which the air of a room may be electrified. One method is that abovementioned: One or more needles are fixed on the prime conductor, which is kept ſtrongly electrified for about 10 minutes. If, afterwards, an electrometer is brought into the room, the air will ſhew that it has received a conſiderable quantity of electricity; for the balls will ſeparate, and continue to do ſo even after the apparatus has been quite removed out of the room. Another method of electrifying the air is to charge a large jar and inſulate it; then connect a ſharp-pointed wire, or a number of them, with the knob of the jar; and make a communication from the outſide coating to the table. If the jar is charged poſitively, the air of the room will likewiſe ſoon become electrified poſitively; but if the jar is charged negatively, the air will alſo become negative. To this it may be replied, that the air is always full of conducting ſubſtances, and that by means of them the electricity is propagated from one part of the air to another. But whether this is the caſe or not, it is certain that the air, notwithſtanding all the conducting ſubſtances it may contain, is in fact an electric, and capable of receiving a charge like glaſs, or any other electric ſubſtance. To this purpoſe there is a very curious experiment made in the following manner. Take two ſmooth boards, of a circular form, and each about three or four feet in diameter. Coat one ſide of each with tin foil, which ſhould be paſted down and burniſhed, and turned over the edge of the board. Theſe boards muſt be both inſulated, parallel to one another, in a horizontal poſition. They muſt be turned with their coated ſides towards each other; and ſhould be placed in ſuch a manner as to be eaſily moved to or from each other; to do which, it will be proper to fix to one of the boards a ſtrong ſupporter of glaſs or baked wood, and to ſuſpend the other by ſilk ſtrings from the cieling of the room; from which it may be lowered at pleaſure by means of a pulley. When theſe boards are placed in the manner above deſcribed, and about an inch diſtant from one another, they may be uſed exactly as the coatings of a pane of glaſs. If a ſpark is given from the conductor to the upper board, a ſpark will inſtantly be diſcharged from the lower one, if any conducting ſubſtance is preſented to it. By continuing to give ſparks to the upper board, and to take them from the lower one, the air between them will at laſt become charged like a piece of glaſs; and if a communication is made between them, they will explode, give the ſhock, &c. like glaſs.

88 Methods of electrifying the air of a room.

89 To charge a plate of air.

In this experiment it ſeems impoſſible to deny that the air is penetrated by electric fluid. The diſtance of an inch is ſo ſmall, that it muſt appear ridiculous to ſay that this ſpace is penetrated only by a *repulſive power*, when in other caſes we plainly ſee the fluid penetrating it to three or four times that diſtance. The flat ſurface of the boards indeed makes the motion of the electric fluid through the plate of air gradual and equal, ſo that it is not ſeen to paſs in ſparks or otherwiſe; but this is neceſſary to its receiving a charge, as will be afterwards explained.

If one electric ſubſtance is penetrable by the electric fluid, we muſt be led ſtrongly to ſuſpect at leaſt, that all the reſt are ſo too. That roſin, pitch, ſealing-wax, &c. are ſo, hath been already proved; and from thence, if we reaſon analogically, we muſt conclude that glaſs is likewiſe penetrable by it. A very ſtrong additional proof of this is, that the electric ſhock cannot be ſent over the ſurface of glaſs. If this ſubſtance was altogether impenetrable to the fluid, it is natural to think, that it would run over the ſurface of glaſs very eaſily. But inſtead of this, ſo great is its propenſity to enter, that a ſhock ſent through between two glaſs plates, if they are preſſed pretty cloſe together, always breaks them to pieces, and even reduces part of them to a powder like ſand. This laſt effect cannot be attributed to any other cauſe than the electric fluid entering the pores of the glaſs; and meeting with reſiſtance, the impetus of its progreſſive motion violently forces the vitreous particles aſunder in all directions.

90 Accounts of globes burſt by electrical operations.

To this violent impetus of the electric fluid when once it is ſet in motion, we may alſo with ſome probability aſcribe the burſting of electric globes, both ſuch as are made of glaſs, and other materials, in the act of excitation. Dr Prieſtley hath given ſeveral inſtances of this accident. "The fragments, (ſays he), have been thrown with great violence in every direction, ſo as to be very dangerous to the byſtanders. This accident happened to Mr Sabbatelli, in Italy; Mr Nollet, in France; Mr Beraud, at Lyons; Mr Boze, at Wittemberg; Mr Le Cat, at Rouen; and Mr Robein, at Rennes. The air in the inſide of Mr Sabbatelli's globe had no communication with the external air, but that of the Abbe Nollet had. This laſt, which was of Engliſh flint glaſs, had been uſed for more than two years, and was above a line thick. It burſt like a bomb in the hands of a ſervant who was rubbing it, and the fragments, none of which were above an inch in diameter, were thrown to a conſiderable diſtance. The

Abbe ſays, that all the globes which were burſt in that manner, exploded after five or ſix turns of the wheel; and he aſcribes this effect to the action of the electric matter making the particles of the glaſs vibrate in a manner he could not conceive.

" When Mr Beraud's globe burſt, (and he was the firſt to whom this accident was ever known to happen), he was making ſome experiments in the dark on the 8th of February, 1750. A noiſe was firſt heard as of ſomething rending to pieces; then followed the exploſion; and when the lights were brought in, it was obſerved that thoſe places of the floor which were oppoſite to the equatorial diameter of the globe were ſtrewed with ſmaller pieces, and in greater numbers, than thoſe which were oppoſite to other parts of it. This globe had been cracked, but it had been in conſtant uſe in that ſtate above a year; and the crack had extended itſelf from the pole quite to the equator. The proprietor aſcribed the accident to the vibrations of the glaſs, and thought the crack had ſome way impeded theſe vibrations. When Mr Boze's globe broke, he ſays that the whole of it appeared, in the act of breaking, like a flaming coal. Mr Boulanger ſays, that glaſs globes have ſometimes burſt like bombs, and have wounded many perſons, and that their fragments have even penetrated ſeveral inches into a wall. He alſo ſays, that if globes burſt in whirling by the gun-barrel's touching them, they burſt with the ſame violence, the ſplinters often entering into the wall. The Abbe Nollet had a globe of ſulphur which burſt as he was rubbing it with his naked hands; after two or three turns of the wheel, having firſt cracked inwardly. It broke into very ſmall pieces, which flew to a great diſtance, and into a fine duſt; of which part flew againſt his naked breaſt, where it entered the ſkin ſo deep, that it could not be got off without the edge of a knife."

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Proofs of
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From theſe appearances we muſt neceſſarily conclude, not only that the electric fluid moves within the ſubſtance of electric bodies, but that it ſometimes moves with extreme violence; ſo that its repulſive power ſeparates even the minuteſt particles from each other; and this could not happen without a thorough penetration of the electric body.—It ſeems, however, more difficult to ſhew, that the electric matter does not generally paſs directly through the ſubſtance of metals, but over their ſurface. A little conſideration, however, will ſhew, that this muſt very probably be the caſe. If we compare Dr Prieſtley's experiments on metals related in § 3. with the effects of the ſolar light collected in the focus of a burning-glaſs upon the ſame metals, we ſhall find a conſiderable degree of reſemblance. Under the article **Burning-glass**, it is obſerved, that, notwithſtanding the prodigious power of that concave mirror with which Mr Macquer melted platina, all bodies did not melt equally ſoon in the focus. In particular, poliſhed ſilver, though a very fuſible metal, did not melt at all. It is not to be doubted, that this was owing to the complete reflection of the light by the ſilver; and had poliſhed pieces of all the metals been tried, it is equally certain, that the difficulty of melting them would have been found exactly proportioned to their reflective power. Something like this happened with Dr Prieſtley; for ſilver was leſs touched by the electric exploſion than any other metal. The violent progreſſive motion of the fluid indeed forced it into the metal, but at the ſame time the reflective power of the ſilver hindered it from going ſo deep as it had done in the others. The caſe was ſtill more evident when melted lead and quickſilver were uſed. Theſe have a very great reflective power; and though by reaſon of the extreme violence wherewith the fluid ſtruck them, part of their ſubſtance might naturally have been ſuppoſed to be diſſipated as in the hard metals, yet we find this was not the caſe. Only a black ſpot was made on the ſurface, and the fluid was immediately diſperſed, moſt probably over the ſurface of the metal.

It is not indeed eaſy to bring a deciſive proof in favour of this hypotheſis. The extreme ſubtilty, and, in moſt caſes, inviſibility, of the electric fluid, render all reaſoning about its motions precarious. It is incredible, however, that this fluid ſhould paſs through the very ſubſtance of metallic bodies, and not be in the leaſt retarded by their ſolid particles. In thoſe caſes, where the ſolid parts of metals are evidently penetrated, *i. e.* when wires are exploded, there is a very manifeſt reſiſtance; for the parts of the wire are ſcattered about with violence in all directions. The like happened in Dr Prieſtley's circles made on ſmooth pieces of metal. Part of the metal was alſo diſperſed and thrown off, for the circular ſpots were compoſed of little cavities. If therefore the fluid was diſperſed throughout the ſubſtance; and not over the ſurface of the metal, it is plain, that a wire whoſe diameter was equal to one of thoſe circular ſpots, ought alſo to have been deſtroyed by an exploſion of equal ſtrength ſent through it. But this would not have been the caſe. A wire whoſe diameter is equal to one of thoſe circular ſpots repreſented in n° 1, 2, 3. fig. 1. Plate CI. would without injury conduct a ſhock much greater than any battery hitherto conſtructed could give. It is moſt probable therefore, that though violent flaſhes of electricity, which act alſo as fire, will enter into the ſubſtance of metals and conſume them; yet it immediately diſſperſes itſelf over their ſurface, without entering the ſubſtance any more, till being forced to collect itſelf into a narrow compaſs it again acts as fire.

In many caſes, the electric fluid will be conducted very well by metals reduced to a mere ſurface, ſo that we can ſcarce ſay they have any thickneſs at all. A piece of white paper will not conduct a ſhock without being torn in pieces, as it is an electric ſubſtance. But a line drawn upon it with a black-lead pencil will ſafely convey the charge of ſeveral jars. It is impoſſible we can think that the fire here paſſes through the *ſubſtance* of the black-lead ſtroke. It muſt run over its ſurface; and if we conſider ſome of the properties of metals, we ſhall find, that there is very great reaſon for believing that their conducting power lies at their ſurface.

The metals are, of all terreſtrial ſubſtances, thoſe which reflect the light moſt powerfully. Sir Iſaac Newton hath ſhewn that this reflective power they have not from their ſubſtance as metals, but from what he calls a *repulſive power*, ſpread equally over their ſurface. The exiſtence of this repulſive power hath already been taken notice of in ſeveral inſtances, particularly in that of a chain, whoſe links cannot be brought into contact with each other without a conſiderable degree of force. It is exceedingly probable, that the repulſive power by which the links of the chain are kept aſunder, and that by which the rays of light are reflected, are one and the ſame. As the electric fluid is known to pervade all ſubſtances, and metals as well as others, it ſeems alſo probable, that the repulſive and reflective power on the ſubſtance of metals is no other than the electric fluid itſelf in a quieſcent ſtate. Perhaps it may be thought abſurd to aſcribe the reflection of light to a ſubſtance of ſuch extreme fluidity and tenuity as the electric fluid is; but we find that the vacuum of an air-pump, a medium of nearly equal tenuity with the electric fluid, (as will elſewhere be proved), is in ſome caſes capable of reflecting light very powerfully. Now it is certain, that nothing can be ſuppoſed to give ſuch an eaſy paſſage to the electric fluid as itſelf; becauſe it is the thinneſt and moſt ſubtile of all the ſubſtances we know, and therefore muſt make the leaſt reſiſtance. Hence the fluid ſlides over the ſurface of a piece of metal with ſurpriſing eaſe; and when a large ſurface of metal is electrified, the effect is proportionable to the extent of it, becauſe all that quantity of electric fluid which is ſpread over the ſurface, eaſily receives the motion communicated by the electrical machine.

The vacuum of an air-pump is found to be a very good conductor, and by means of it the motion of the fluid is rendered viſible. Hence this is brought as an argument that the electric fluid *always* paſſes through the ſubſtance of conductors. That it doth ſo in ſome caſes is indeed very evident, but it then meets with conſiderable reſiſtance; and, even in the preſent inſtance, the paſſing thro' the vacuum of an air-pump, where it is oppoſed by a conſiderable quantity of the ſame kind of fluid, gives ſuch a conſiderable reſiſtance, that it will prefer a paſſage along a metalline rod to one through a vacuum. With regard to charcoal, and other conductors of that kind, as they are very porous, and likewiſe compoſed of fine ſpiculæ, it is probable the fluid may run along the ſurface of the ſpiculæ, and at the ſame time through the ſubſtance of the coal. Even in paſſing over the beſt conductors, however, this fluid meets with ſome reſiſtance, as it will prefer a ſhort paſſage through the air to a long one through the beſt conductors.

§ 5. *The exceeding great Velocity and Strength of the Electric Fluid are not owing to a repulſive Power among its Particles, but to the mutual Action of the Air and Electric Fluid upon themſelves and one another.*

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Electric fluid ſhewn to be not repulſive of itſelf.

THE arguments for a repulſive power exiſting between the particles of the electric fluid are very inconcluſive. Some of them have been already taken notice of. The ſtrongeſt is that drawn from the appearance of the electric fire iſſuing from a point, or from any body highly electrified. In the open air this diverges exceſſively; and very often divides into ſeveral diſtinct rays, which by avoiding each other ſeem to be violently repulſive. That they are not ſo in reality, however, is plain from the appearance they have *in vacuo*; when, the reſiſtance of the atmoſphere being taken off, the electric light would have room to ſpread more widely. Fig. 15. Plate C. repreſents an exhauſted receiver with an electrified wire diſcharging a ſtream of this fluid from itſelf, by means of its communication with a machine. If the electric matter then was really elaſtic, or endowed with a power repulſive of itſelf, it is impoſſible it could paſs in an uninterrupted column through an exhauſted receiver as in the figure. A column of air, if blown ſwiftly thro' the orifice of a ſmall pipe, will go forward a conſiderable way, if it is counterbalanced by air like itſelf on every ſide. But if ſuch a column enters a vacuum, what we call its *elaſticity*, occaſions it to be diſſipated in a moment, and equally diffuſed through the whole exhauſted receiver. But this by no means happens to the electric fluid; for even the ſmall divergency repreſented in the figure, ſeems entirely owing to ſome quantity of air left in the air-pump. Dr Watſon, by means of a long bent tube of glaſs filled with mercury, and inverted, made all the bended part which was above the mercury, the moſt perfect vacuum that can be made. This vacuum he inſulated; and one of the baſons of mercury being made to communicate with the prime conductor, when ſome non-electric ſubſtance touched the other, the electric matter pervaded the vacuum in a continued arch of lambent flame, and, as far as the eye could follow it, without the leaſt divergency. From theſe experiments it appears, that there is in the vacuum of an air-pump, as well as in the Torricellian vacuum, a fluid of nearly the ſame denſity with the electric one: that the electric fluid is not repulſive of itſelf, but is reſiſted by the atmoſphere; and therefore all appearances of electrical light are leſs bright *in vacuo* than in the open air; becauſe, the more reſiſtance the matter meets with, the brighter is the flaſh.

Thus, as long as a ſtream of electric fluid is moved through a medium of an equal denſity with itſelf, the equable preſſure of the fluid all round will keep the luminous ſtream from diverging; but if the preſſure is taken off from any part of the receiver, the preſſure of the reſt will immediately force the ſtream to that place, as repreſented fig. 16. That it is by a preſſure of this kind, and not by any obſcure *attractive power*, that this is occaſioned, will be rendered very probable from the following example. Suppoſe a pot or kettle is boiling violently over a fire, and in ſuch a ſituation that there is very little agitation in the ſurrounding air. The equal preſſure of the atmoſphere will then force the ſteam ſtraight upwards in a cylindrical column; but if any object is brought near the edge of the pot, ſo that the preſſure of the atmoſphere is taken off on one ſide, the ſteam will be directly forced upon that body, or ſeemingly attracted by it. The electric matter therefore, being capable of having its motions reſiſted by the air, muſt immediately fly to that place where the reſiſtance is leaſt; but in the caſe above-mentioned, this is beſt done by applying a conducting ſubſtance to the ſide of the receiver, or one along which the fluid can run downward to the earth. This, however, will be more fully explained when we ſpeak of the phenomena of the Leyden phial.

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Origin of the prodigious powers of electricity.

From this ſimple principle, *viz.* that fluids impelled by any force will always tend towards that place where there is the leaſt reſiſtance, may moſt of the phenomena of electricity be explained. The firſt thing to be conſidered is, From what ſource it originally derives the aſtoniſhing agility and ſtrength diſplayed in its motions. If it is granted that the electric fluid is the ſame with the ſolar light, the ultimate cauſe of its momentum muſt be the power by which the light of the ſun is emitted. As this power extends through regions of ſpace which to our conceptions are truly *infinite*, ſo muſt the power itſelf be; and it is plain, that by its equable action all round, throughout the whole ſpace through which the ſun's light is propagated, the preſſure of it upon all bodies muſt be equal all round, and conſequently it can neither move them one way nor another. But if, by the intervention of ſome other power, the preſſure is leſſened upon any particular part, a current of electric matter will ſet towards that part, with a force exactly proportioned to the diminution of the preſſure. Thus, in the common experiments of the air-pump, when the air is exhauſted from a glaſs veſſel, the preſſure of the ſuperincumbent atmoſphere is directed towards every part of the glaſs, ſo that if it is of a flat ſquare ſhape, and not very ſtrong, it will certainly be broken. But after the air is exhauſted, the veſſel is diſcovered to be full of another ſubtile fluid of the ſame nature with the electric one *. If this could alſo be extracted from the veſſel, the preſſure on its ſides would neceſſarily be much greater, becauſe not only the atmoſphere, but the whole ſurrounding ether or electric matter, would urge towards the place; and it is not probable, that this preſſure could be reſiſted by any terreſtrial power whatever. The momentum of the electric matter therefore, in our experiments, depends on two cauſes, *viz.* the preſſure of the atmoſphere upon the electric matter, and the preſſure of one part of this matter upon another. The celerity with which it moves may be explained from its parts lying in contact with each other throughout the wide immenſity of ſpace. Hence the great tendency of the fluid to circulate; becauſe, from whatever point a ſtream of it is ſent off, there the preſſure is leſſened, and the ſtream, finding no place empty for its reception, muſt neceſſarily have a tendency to return to the place from whence it came, as there it meets with the leaſt reſiſtance; and hence, when a paſſage is opened for it, by which it can return to this point, it is urged thither with great violence, the equable preſſure is reſtored, and the artificial motion ceaſes.

§ 6. *The manner in which an Electric Subſtance becomes excited, or diffuſes its Electric Virtue.*

THIS will eaſily appear, from conſidering the means taken for the excitation of a common cylinder for electric experiments. The glaſs is a ſubſtance, as we have already ſeen, into which the electric matter is very apt to enter. To the ſurface of the glaſs is applied ſome amalgam ſpread on leather. This is a metallic ſubſtance which has an exceeding great reflective power, being that which is employed for ſilverizing looking-glaſſes. The electric fluid therefore runs over its ſurface with great eaſe, and there is always a certain quantity of this fluid in a ſtate of ſtagnation on its ſurface. At the place where the cylinder touches the amalgam, the air is excluded, and conſequently the electric fluid hath there a tendency to riſe more than at any other part of the ſurface where the atmoſphere preſſes with its full force. When the cylinder begins to turn, it neceſſarily forces before it a ſmall quantity of that electric matter which lay upon the ſurface of the amalgam. To underſtand this the more eaſily, we muſt conſider that property which glaſs has of tranſmitting the electric fluid through it, and refuſing it a paſſage along its ſurface. Thus we may conceive it to be formed of a vaſt number of exceedingly ſmall tubes placed cloſe to each other. If we ſuppoſe any ſubſtance made by art of ſuch a texture, we would find it impoſſible to pour water along its ſurface, though it would very eaſily run through it. If ſuch a ſubſtance was made in the ſhape of a cylinder, and turned briſkly round, with its ſurface juſt touching a quantity of water contained in a veſſel, the conſequence would be, that the water would be ſcattered around in all directions. The caſe ſeems to be the ſame with the more ſubtile electric fluid. The glaſs cylinder throws out part of the electric fluid lying on the ſurface of the amalgam. This quantity is perpetually renewed from the conducting ſide of the rubber. The quantity which is thrown out cannot be conducted over the ſurface of the glaſs, nor can it paſs through it; becauſe it is reſiſted by the air in the inſide, and, in ſome meaſure, by the glaſs itſelf. It is alſo reſiſted by the air on the outſide; but as that reſiſtance is leſs than what is made by the air and glaſs both put together, the fluid naturally forces itſelf into the open air. Still, however, there neither is, nor can be, any *accumulation* of the matter itſelf. It cannot enter the air without diſplacing the electric matter which was there before. This will diſplace more of the ſame kind, and ſo on, till at laſt the motion is communicated to the electric matter lodged in ſome part of the earth. From thence it is propagated to the rubber of the electric machine, and thus a kind of circulatory motion is carried on.—By the excitation of an electric ſubſtance, therefore, the fluid is not accumulated, but only ſet in motion. The reaſon of that ſeeming accumulation obſervable about the excited cylinder is, the reſiſtance which the fluid meets with from the air. This inſtantly produces a divergency in the ſtream of electric matter, and a vibratory ſtruggle betwixt it and the air; which, again, produces the appearances of fire and light, for the reaſons already given.

94 Proofs of the vibratory motion of the electric fluid.

That this kind of vibratory motion or ſtruggle between the electric fluid and air always takes place when the latter is ſet in motion, ſeems evident from the ſenſation which is felt when a ſtrongly excited electric is brought near any part of the human body. This is ſuch as would be occaſioned by a ſpider's web drawn lightly along the ſkin, or rather by a multitude of ſmall inſects crawling upon the body. It is, however, more clearly proved by an experiment made by Dr Prieſtley. He was deſirous to know whether the electric fluid was concerned in the freezing of water or not. For this purpoſe, he expoſed two diſhes of water to the open air in the time of a ſevere froſt. One of them he kept pretty ſtrongly electrified; but could obſerve no difference in the time either when it began to freeze, which was in about three minutes, or in the thickneſs of the ice, when both had been frozen for ſome time. Happening to look out at the window through which he had put the diſhes, he obſerved on each ſide of the electrified wire, the ſame dancing vapour which is ſeen near the ſurface of the earth in a hot day, or at any time near a body ſtrongly heated.

95 Why an exhauſted cylinder cannot be excited.

If the glaſs cylinder which we want to excite is exhauſted of air, the electric matter, inſtead of flying off into the air, runs directly through the glaſs; and, meeting with ſome reſiſtance from the *vacuum* as it is called, a weak light is produced in the inſide, but no ſigns of electricity are perceived on the outſide of the glaſs. The ſame thing happens by giving the cylinder or tube a metallic coating. The fluid collected from the rubber runs directly through the glaſs, and along the ſurface of the metallic coating, which keeps off the preſſure of the air contained in the glaſs.—If an electric lining is uſed, and the glaſs is exhauſted of air, the motion of the fluid becomes viſible through both, and the whole is tranſparent, as already obſerved.—If the cylinder is lined with an electric ſubſtance, and the air is not exhauſted, the electricity on the outſide is often conſiderably increaſed; but the reaſon of this is not evident. Moſt probably it is owing to the different kind of electricity acquired by the inſide lining; for electricity of any kind always produces its oppoſite at a ſmall diſtance, the reaſon of which ſhall be afterwards given.

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* See Vacuum.

96
Nor one filled with condenſed air.

If the air within the cylinder is condenſed, the electrical appearances on the outſide are leſſened in proportion. The reaſon of this ſeems to be, that though it is neceſſary that the fluid ſhould not go through the ſubſtance of the glaſs very eaſily, yet it is requiſite that its paſſage ſhould not be totally obſtructed, and therefore the electric experiments ſucceed beſt when the air within the glaſs is a little rarefied. We muſt alſo conſider, that when an additional quantity of air is forced into the cylinder, an equal bulk of electric matter is forced out. The reſt of the matter, therefore, which is contained all round the glaſs, preſſes violently into its pores; but this preſſure, being directly oppoſite to what happens when the glaſs is excited, muſt of conſequence hinder the excitation. If the glaſs is now made very hot, the preſſure of the atmoſphere is kept off, and the paſſage of the electric fluid through the glaſs and condenſed air is rendered eaſier, and therefore the electric appearances on the outſide return.

On the ſame principles may we explain the excitation of a ſolid ſtick of glaſs, ſealing-wax, or ſulphur. Though theſe have no air within them, yet they have a very conſiderable quantity of electric matter, which reſiſts an expulſion from its place: and therefore, tho' it may yield a little when the rubber is applied to the outſide, yet it will inſtantly throw off into the atmoſphere what the rubber has left on the ſurface; becauſe the reſiſtance is leaſt towards that place, as ſoon as the electric has come out from under the rubber. Hence alſo, we ſee the reaſon why no ſigns of electricity are obſerved on glaſs to which the rubber is immediately applied; namely, becauſe the preſſure being equally great all round, no part of the electric fluid can be thrown off into the atmoſphere, in order to ſet the reſt in motion.

The only thing neceſſary to be added in confirmation of this theory of excitation is, that electric ſubſtances of the ſame kind cannot be excited by rubbing them againſt one another. Thus glaſs cannot be excited by rubbing it againſt glaſs, &c. Mr Wilcke obſerved, that when two pieces of glaſs were rubbed upon each other in the dark, a very vivid light appeared upon them; which however threw out no rays, but adhered to the place where it was excited. It was attended with a ſtrong phoſphoreal ſmell, but no attraction or repulſion. From this experiment he inferred, that friction alone would not excite electricity; but that to produce this effect, the bodies rubbed together muſt be of different natures with reſpect to their attracting the electric fluid.

§ 7. *Of Poſitive and Negative Electricity.*

FROM what hath been already advanced, it will pretty plainly appear, that to increaſe the quantity of electric fluid in any body is a thing impoſſible, unleſs we alſo augment the ſize of the body. All the fine pores of every terreſtrial fluid are exceedingly full, and unleſs we ſeparate the minuteſt particles of the body farther from one another than they are naturally, we cannot introduce more of the electric fluid into it than there was before. This fluid, we have already ſeen, is not, like the air, endued with a repulſive force between its particles; and therefore it muſt be incompreſſible. If it is incompreſſible, all the phenomena attending it muſt be owing to its various motions, and the ſeeming accumulations of it muſt be owing only to its more briſk action in ſome places than in others. But before a complete ſolution of the phenomena of poſitive and negative electricity can be given, it is neceſſary to ſhew that theſe are not ſo eſſentially diſtinct and oppoſite as they have been thought to be, but may be converted into each other in ſuch caſes as we cannot poſſibly ſuppoſe either an addition or ſubtraction of the electric fluid.

97
Methods of changing poſitive and negative electricity into one another.

This poſition, however oppoſite to the common opinions on the ſubject, may be proved by the following experiments. 1. Let a coated phial be ſet upon an inſulating ſtand, and let its knob be touched by the knob of another phial negatively electrified. A ſmall ſpark will be obſerved between them, and both ſides of the inſulated phial will inſtantly be electrified negatively. Now, though we may ſuppoſe the one ſide of the phial which is touched by the negatively electrified one to loſe part of its fire, yet this cannot be the caſe with the other, becauſe there is nothing to take it away, and therefore it ought to appear in its natural ſtate. 2. Let a phial, having a pith-ball electrometer faſtened to its outſide coating, be ſlightly charged poſitively, and then ſet upon an inſulated ſtand. The outſide is then negatively electrified, or, according to Dr Franklin's theory, has too little electric matter in it. The pith-balls, however, will touch each other, or ſeparate but in a very ſmall degree: but let the knob of another bottle, which hath received a ſtrong charge of poſitive electricity, be brought near to the knob of the firſt, and the pith-balls on the outſide will diverge with poſitive electricity. Now, it is impoſſible that any ſubſtance can have both too much and too little electric matter at the ſame inſtant: yet we ſee that negative electricity may thus inſtantaneouſly be converted into the poſitive kind, in circumſtances where no addition of fire to the outſide can be ſuppoſed. 3. Let the ſame phial, with the pith-balls affixed to its outſide coating, be ſlightly charged negatively, and then inſulated. The outſide is now electrified poſitively, or, according to Dr Franklin's hypotheſis, has too great a quantity of electric fluid. Nevertheleſs, upon bringing the knob of a phial ſtrongly electrified negatively to that of the inſulated one, the pith-balls will inſtantly diverge with *negative* electricity. 4. Let a phial receive as full a charge of poſitive electricity as it can contain, and then inſulate it. Charge another very highly with negative electricity. Bring the knob of the negative bottle near that of the poſitive one, and a thread will play briſkly between them. But when the knobs touch each other, the thread after being attracted will be repelled by both. The negative electricity is ſomehow or other ſuperinduced upon the poſitive; and, for a few moments after the bottles are ſeparated, both will ſeem to be electrified negatively. But, if the finger is brought near the knob of that bottle on which the negative electricity was ſuperinduced, it will inſtantly be diſſipated, a ſmall ſpark ſtrikes the finger, and the bottle appears poſitively charged as before.

From theſe metamorphoſes of poſitive into negative, or negative into poſitive electricity, it ſeems proven in the moſt deciſive manner, that poſitive electricity doth not conſiſt in an *accumulation*, nor the negative kind in a *deficiency*, of the electric fluid. We are obliged, therefore, to adopt the only probable ſuppoſition, namely, that both of them ariſe entirely from the different directions into which the fluid is thrown in different circumſtances. The only method, therefore, of giving an intelligible explanation of poſitive and negative electricity is by conſidering the different direction of the fluid in each.

98
Method of determining the direction of the fluid.

A great variety of methods have been contrived to aſcertain the direction of the electric fluid, but all of them ſeem uncertain except that which is drawn from the appearance of electric light. The luminous matter appearing on a point negatively electrified is very ſmall, reſembling a globule; it makes little noiſe, and has a kind of hiſſing ſound. The poſitive electricity, on the other hand, appears in a diverging luminous ſtream, which darts a conſiderable way into the air, with a crackling noiſe. Now, it is certain, that in whatever caſe the electric fluid darts from the point into the air, in that caſe it muſt be the moſt reſiſted by it; and this is evidently in the poſitive electricity. In this, the rays evidently *diverge* from the points. We may, indeed, ſuppoſe them to be *converging* from many points in the ſurrounding air towards the metallic point. But why ſhould we imagine that a viſible ray would break out from one place of the atmoſphere more than another? The air, we know, reſiſts the motion of the electric fluid, and it certainly muſt reſiſt it equally. Of conſequence, when this fluid is coming from the air towards a pointed conductor, it muſt percolate ſlowly and inviſibly through the air on all ſides equally, till it comes ſo near that it is able to break through the intermediate ſpace; and as this will likewiſe be equal, or nearly ſo, all round, the negative electricity muſt appear like a ſteady luminous globule on the point, not lengthening or ſhortening by flaſhes as the poſitive kind does. Electricians have therefore determined with a great deal of reaſon, that when a point is electrified poſitively the matter flows out from it.

It is to be remarked, however, that in moſt caſes, if not in all, a body cannot be electrified negatively till it has firſt become poſitively electrified; and it is in the act of diſcharging its poſitive electricity that it becomes negative. Thus, ſuppoſe a coated phial to be ſet upon an inſulated ſtand, and its knob is approached by that of another bottle charged poſitively: a ſmall ſpark is obſerved between them, and both ſides of the inſulated bottle are electrified poſitively; but as ſoon as the finger is brought near to the outſide, the poſitive electricity is diſcharged by a ſpark, and a negative one appears. But from what hath been already advanced, it is evident, that poſitive electricity is when the fluid hath a tendency to leave any body, and the negative electricity when it hath the ſame tendency to enter it. Therefore, as the electric fluid is ſubject to mechanical laws as well as other fluids, it muſt follow, that theſe tendencies are produced and kept up by the motions excited originally in the air, and electric fluid in the air, ſurrounding theſe bodies. If this principle is kept in view, it will lead us to an eaſy explanation of many electrical phenomena, for which no ſatisfactory reaſon hath hitherto been given.

§ 8. *Of Electric Attraction and Repulſion.*

It hath now been ſhewn, that, in bodies electrified poſitively, there is a flux of electric matter from their ſurface all round; that is, the fluid contained in their pores puſhes out on every ſide, and communicates a ſimilar motion to the electric fluid contained in the adjacent atmoſphere. This muſt of neceſſity very ſoon exhauſt the body of its electric matter altogether, if it was not inſtantaneouſly ſupplied with it after every emiſſion. But this ſupply is immediately procured from the ſurrounding atmoſphere. The quantity ſent off is inſtantly returned from the air, and the vibratory motion or ſtruggle between the air and electric fluid, which hath been often mentioned, immediately takes place. The poſitive electricity therefore conſiſts in a vibratory motion in the air and electric fluid; and the force of this vibration is directed outwards from the electrified body. In bodies negatively electrified, the fluid contained in the neighbouring atmoſphere is directed towards the body ſo electrified. But it is certain, that this motion inwards cannot be continued unleſs there is alſo a motion of the fluid outwards from the body. In this caſe alſo there is a vibratory motion, but the force of it is directed inwards, and as the ſource of it lies not in the body, but in the ſurrounding atmoſphere, it manifeſts itſelf ſomewhat leſs vigorouſly.

99
Why electric appearances continue ſo long.

The reaſon why theſe motions are continued for ſuch a length of time as we ſee they are, is, the extreme mobility of the electric fluid. It doth not indeed appear from any experiments, that this fluid hath the leaſt friction among its parts. A motion once induced into it muſt therefore continue for ever, until it is counteracted by ſome other motion of the ſame fluid. Hence, when a vibratory motion is once introduced among the particles of the electric fluid contained in any ſubſtance, that motion will be kept up by the ſurrounding fluid, let the body be removed to what place we pleaſe. There is no occaſion indeed for ſuppoſing any thing like an electric atmoſphere round the electrified body. The caſe is exactly the ſame as with a burning body. Let a candle be carried to what place we will, it will ſtill burn; but it would be abſurd to ſay, that the fire ſurrounded it like an atmoſphere, as we know the fire is kept up by the air only, which is changed every moment. In like manner, the poſitive and negative electricities, which are two different motions of the electric fluid, are kept up by the air and electric matter contained in it; and, wherever the electrified body is carried, theſe fluids are equally capable of continuing them.

The phenomena of attraction and repulſion are now eaſily explained. Let us ſuppoſe a body poſitively electrified ſuſpended by a ſmall thread, at a diſtance from any other. The vibration above-mentioned, in which poſitive electricity conſiſts, being kept up by the equable preſſure on all ſides, the body is neither moved to one ſide nor another. But when a negatively electrified body is brought near, the force of the vibration being directed outwards in the one, and inwards in the other, the preſſure of the fluid in the intermediate ſpace between them is greatly leſſened; and of conſequence the preſſure on the other ſides drives them together, and they are ſaid to *attract* each other. If another body, electrified alſo poſitively, is brought near to the firſt, the force of the vibrations are directly oppoſed to one another, and therefore the bodies recede from each other, and are ſaid to *repel* one another.—The caſe is the ſame with two bodies negatively electrified: for there the electricity, as far as it extends round the bodies, conſiſts of a vibratory motion of the electric fluid; and the vibrations being directed towards both the bodies, as towards two different centres, muſt neceſſarily cauſe them recede from each other; becauſe, if they remained in contact, the vibratory motions would interfere with and deſtroy one another.

When a ſmall body is brought within the ſphere of another's electricity, the equable preſſure of that vibratory or electrical ſphere is ſomewhat leſſened upon the ſide near which the ſecond body is brought; and therefore it is immediately impelled towards the firſt, by the action of the ſurrounding fluid, in order to keep up the equilibrium. As ſoon as it arrives there, the vibrations of the fluid around the firſt body being communicated to that within the pores of the ſecond, it immediately acquires a ſphere of electricity as well as the firſt, and is conſequently repelled. The repulſion continues till the vibration ceaſes either by the action of the air, or by the body coming in contact with another much larger than itſelf, in which caſe the electricity is ſaid to be *diſcharged*. If, after this diſcharge of electricity, the ſecond body is ſtill within the electric ſphere of the firſt, it will immediately be attracted, and very ſoon after repelled, and ſo on alternately till the electricity of the former totally ceaſes.

§ 9. *Of the Diſcharge of Electricity by Sparks upon blunt Conductors, and ſilently by pointed ones.*

100 Electricity only ſhews itſelf in the air.

THE manner in which this is accompliſhed will beſt appear from conſidering the nature of what is commonly called *electricity*. This cannot appear but in an electric ſubſtance, and the ſubſtance in which it doth appear is the air. The prime conductor of an electrical machine diſcovers no other properties in itſelf when electrified, than it had before. The metal is equally hard, ſhining, and impenetrable. The electricity, or properties of attracting, repelling, &c. are all lodged in the air; and if the conductor is placed *in vacuo*, they inſtantly ceaſe. It hath already been ſhewn, that the electric matter runs over the ſurface of conducting ſubſtances in great quantities, like a ſtream of water running from one place to another. In this manner it will not paſs over the ſurface of electrics. It enters their ſubſtance, and paſſes through it with a vibratory motion. This vibratory motion always ſhews a reſiſtance; nor is it in any caſe poſſible to induce a vibration without firſt impreſſing a motion in one direction, and then reſiſting it by a contrary motion. Round the ſurface of an electrified body ſuſpended in the air, therefore, there is always an equable preſſure, by which the emiſſion of the electric fluid is every moment checked, and by which its vibrations are occaſioned. When a metallic ſubſtance is brought near the electrified body, the fluid has an opportunity of making its eſcape, provided it could get at the metal, becauſe it could run along its ſurface. The preſſure of the air is alſo leſſened on that ſide which the conducting ſubſtance approaches. The whole effort of the electric matter contained in the vibratory ſphere is exerted againſt that ſingle place, becauſe the reſiſtance is leaſt. If the body has a broad ſurface, however, the diſproportion between theſe reſiſtances is not ſo great as when its ſurface is leſs. Let us ſuppoſe, for inſtance, that the ſurface of the conducting ſubſtance contains an inch ſquare, and that the whole ſurface of the electrified ſphere contains only ſix ſquare inches. When the conducting ſubſtance approaches, all the preſſure is directed towards that place; and the effort made by the electric matter to eſcape there, is five times as great as what it is any where elſe. Nevertheleſs, though it has a vibratory motion in the ſubſtance of the air, it cannot have a progreſſive motion through it without violently diſplacing its parts; and an inch ſquare of air makes a conſiderable reſiſtance. At laſt, however, if this reſiſtance is every moment made leſs by approaching the conducting ſubſtance nearer to the electrified body, the electric matter breaks through the thin plate of air, ſtrikes the conductor, and runs along it. The ſpark is produced by the reſiſtance it meets with from the air.—But if, inſtead of a body with a broad ſurface, we preſent the point of a needle, whoſe ſurface is perhaps not above the ten-thouſandth part of a ſquare inch, the effort of the electric matter to diſcharge itſelf there will be 60,000 times greater than at any other place, becauſe the whole effort of the ſix ſquare inches, of which we ſuppoſe the ſurface of the electric ſphere to conſiſt, is exerted againſt that ſingle point. The air alſo reſiſts, as in the former caſe; but it can reſiſt only in proportion to the extent of its ſurface which covers the conducting body; and this, being only the ten-thouſandth part of a ſquare inch, muſt be exceedingly little. As ſoon therefore as a needle, or any other fine pointed body, is preſented to an electrified ſubſtance, the electric matter is urged thither with great velocity; and as it hath an opportunity of running along the needle, its vibrations quickly ceaſe, and the electricity is ſaid to be *drawn off*.—This drawing off, however, does not extend all round the electrified body, if means are uſed to keep up the electricity perpetually. Thus, if, on the end of the prime conductor, there are faſtened a number of fine threads, hairs, &c. when the cylinder is turned, the threads on the end will diverge, and ſpread out like as many rays proceeding from a centre. If a point is preſented on one ſide of the conductor, though at a conſiderable diſtance, the threads on one ſide will loſe their divergency and hang down, but thoſe on the other ſide will continue to diverge. The reaſon of this is, the difficulty with which the electric fluid gets thro' the atmoſphere, even where the reſiſtance of it is made as little as poſſible; and hence alſo we may ſee why more conductors than one may be neceſſary for the ſafety of large buildings. See Thunder.

§ 9. *Why Poſitive Electricity hath a tendency to induce the Negative Kind on any Body kept within its ſphere of action, and why Negative Electricity produces the Poſitive Kind in ſimilar circumſtances.*

This is one of the electrical phenomena moſt difficult to be ſolved; and indeed ſeems totally inſolvable, unleſs we give up the idea of *accumulation* and *deficiency* of the electric fluid in different bodies. On Dr Franklin's principles, no ſolution hath been attempted. Mr Cavallo places this among the *properties* of electricity for which he doth not pretend to account, but gives as the *cauſes* of other phenomena. It is indeed certain, that if a body hath already *too much* electricity or any thing elſe, it cannot be continually taking from thoſe around it; and if it hath *too little*, it cannot be continually giving them. By attending to the principles above laid down, however, this phenomenon admits of an eaſy ſolution. As poſitive electricity conſiſts in a vibratory motion of the electric matter in the pores of any body, and to ſome diſtance through the air, while at the ſame time the force is directed outwards from the body, it is plain, that if any other body is brought within this ſphere, the direction of the vibration is changed; for what is *outwards* from the one, is *inwards* to the other. But a vibratory motion, the force of which is directed *inwards*, is what conſtitutes negative electricity; and, therefore, no ſooner is any body placed at ſome diſtance from one poſitively electrified, than it immediately becomes negatively ſo. The ſame reaſon may be given why negative electricity produces the poſitive kind on a body placed near it. In the negative kind, the force of the vibration is directed inwards. If another body is brought near, the vibration which is *inwards* to the firſt, muſt be *outwards* from the ſecond, which thus becomes poſitively electrified. The only difficulty here, is to account for this motion, which is only inward or outward to one ſide of the body brought near the electrified one, being ſo ſuddenly propagated all round. This, however, muſt eaſily be ſeen to ariſe from the extreme ſubtilty of the electric fluid, and its effort to keep up an equilibrium in all parts, which it will never ſuffer to be broken. When this fluid puſhes inward to one ſide of a body, the fluid contained in that body would immediately yield, and allow a free paſſage to what came after, if its yielding was not obſtructed by ſomething on the other ſide. This obſtruction ariſes from the air, which cannot admit a progreſſive motion of electric matter through it. No ſooner, therefore, is a puſh made againſt one ſide than a contrary one is made againſt the other; and thus the body inſtantly becomes electrified all round.

101 Why a motion of the electric fluid on one ſide is ſuddenly propagated round a body.

102 Zones of poſitive and egative e- ctricity ccounted or.

On theſe principles, alſo, may we account for the zones of poſitive and negative electricity which are to be found on the ſurface of glaſs tubes *; and eſpecially in electrified air. When the prime conductor of a machine is ſtrongly electrified poſitively, it is throwing out the fluid from it in all directions. The air cannot receive this fluid without throwing out that which it alſo contains; and this ſhews, that ſimple electrification can neither increaſe nor diminiſh the denſity of the air, which is alſo vouched by numberleſs experiments. But, if the air throws out its electric fluid in all directions, it muſt throw part of it back upon the conductor, and conſequently obſtruct its operations. This likewiſe is found to be the caſe; for it is impoſſible to make an electric machine act long with the ſame degree of ſtrength, owing to the electricity communicated from it to the air. But if the conductor and air are thus reciprocally throwing the electric matter back upon one another, it is impoſſible but another zone of air which lies at a greater diſtance muſt be continually receiving it, or be electrified negatively. But this cannot receive, without alſo emitting the fluid it contains; which, therefore, will be thrown upon another zone behind it, and partly back upon the firſt. The original force of the fluid being now ſpread over a large ſpace, will conſequently be diminiſhed; and the ſucceeding zone will be electrified weakly, though poſitively. In like manner, a ſucceeding zone muſt yield, and receive the fluid from this; which will conſequently be electrified negatively, though weaker than the former: and thus zones of poſitive and negative electricity will gradually ſucceed each other in the air, till no traces of either are to be found.—In theſe zones, it muſt be remembered, that there is a centre peculiar to each, and from this centre the vibrations proceed either inward or outward. Thus, when the machine is firſt ſet in motion, a vibration is propagated from it as from a centre to ſome diſtance in the air, and the air is at firſt negatively electrified. But as this vibratory motion cannot be extended far in one direction, vibrations begin to be propagated in all directions from another centre at ſome diſtance. The conductor becomes then leſs poſitively electrified than before; however, by means of the machine, its electricity is ſtill kept up, though weaker; but a zone of air beyond the firſt, where the reſiſtance is much leſs, becomes negatively electrified. This again cannot continue long till vibrations outwards ariſe from another centre, and ſo on. It is ſcarce needful to add here, that the longer the electrification is continued, and the ſtronger it is, the broader theſe zones muſt be.

§ 10. *Of the Leyden Phial.*

The phenomena of the Leyden phial are eaſily explained from what hath been already advanced. Glaſs and other electric ſubſtances are ſo conſtituted, that they can tranſmit the vibratory motions of the electric matter, though they cannot admit of any conſiderable progreſſive one. Conducting ſubſtances, on the other hand, admit of a progreſſive motion, but not ſo eaſily of a vibratory one. When the electric fluid is procured from the earth by an electric machine, if the conductor had a communication with the earth, all the matter collected by the cylinder would run along the conductor into the earth, and not a ſpark or other appearance of electricity would be procured in the air. But when the conductor is inſulated, the matter is forced to go off into the air, and there produces the vibratory motions already mentioned. If a pane of glaſs which has no metallic coating touches the conductor, though it is permeable by the vibratory motion of the fluid, yet a conſiderable reſiſtance is made, and the fluid cannot eaſily diffuſe itſelf over its ſurface.

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* See nº 60.

103 In what manner a phial becomes charged.

ſurface. Nevertheleſs, it will ſoon ſhew ſigns of having received electricity, that is, of having the fluid within its pores thrown into a vibratory motion. This motion is directed outwards, from the middle of the ſubſtance of the glaſs, to the ſurface, and a conſiderable way beyond it on both ſides. Both ſides of the glaſs are then poſitively electrified. If a conducting ſubſtance touches one of the ſides of the glaſs, the vibrations on that ſide are deſtroyed; becauſe the fluid which occaſioned them yields to the reſiſtance it met with, and runs along the conductor into the earth. But no ſooner is this done, than the power which reſiſted the vibration outward from the glaſs, having got the better in the manner juſt now explained, a new vibration is produced by that reſiſting power; and the force of this vibration is directed towards the ſide from whence the electricity was drawn off, which therefore becomes electrified negatively. Thus may we underſtand how a pane of glaſs, or any other electric, may receive poſitive electricity on the one ſide, and negative on the other, to as high a degree as we pleaſe. But there is found to be a limit to every charge of electricity we can give; and this limit is the reſiſtance of the air. A phial will contain double the charge in air doubly condenſed, that it does in the common atmoſphere; and when once the vibration becomes too great to be borne, the poſitive ſide of the glaſs throws out pencils of light, and will receive no more electricity in that ſtate of the atmoſphere.

104 Why it retains its charge.

Thus, in every charged phial, there is a violent impulſe or vibration of the fluid, *outward* from the poſitive, and *inward* to the negative, ſide. As long as theſe continue, the phial continues charged. As the electric fluid ſeems to be ſubject to no other natural power, but controuls all its own actions only by moving in oppoſite directions, it is plain, that if a charged phial is carefully kept from any of thoſe means by which it is known to be diſcharged, it muſt keep its charge for a long time; and thus, by keeping phials within glaſs caſes, their charge will be retained for ſix or eight weeks, or perhaps a great deal longer. The only method of diſcharging a phial, is by making a communication between its coatings. The fluid preſſing out of the poſitive ſide, now yields to the preſſure of that from the negative ſide, and runs along the conductor. But no ſooner does it come near the negative ſide of the phial, than, meeting with more of the ſame kind, the current of which is directed the ſame way, both together break through the air with a violent flaſh and crack, and all appearances of electricity ceaſe. —In this, as in all other electrical experiments, it is eaſy to ſee, that the force, velocity, &c. of the fluid depends entirely on the preſſure of that which ſurrounds us. Nature hath appointed a certain conſtitution or modification of the electric fluid in all terreſtrial bodies, and likewiſe all round the earth. In our electrical experiments, we violate this conſtitution in ſome degree. When this violation is but ſmall, the powers of nature operate gently in repairing the diſorder we have introduced; but when any conſiderable deviation is occaſioned, the natural powers reſtore the original conſtitution with extreme violence.

105 Reaſon of its diſcharge.

§ 11. *The Phenomena of the Electrophorus accounted for.*

106 Conſtruction of the electrophorus.

The electrophorus is a machine repreſented Plate CI. fig. 3. It conſiſts of two plates, A and B, uſually of a circular form; though they may be made ſquare, or of the figure of a parallellogram, with more eaſe, and with equal advantage. At firſt the under plate was of glaſs, covered over with ſealing-wax; but there is little occaſion for being particular either with regard to the ſubſtance of the lower plate, or the electric which is put upon it. A metallic plate, however, is perhaps preferable to a wooden one, though the latter will anſwer the purpoſe very well. This plate is to be covered with ſome electric ſubſtance. Pure ſulphur anſwers very near as well as the dearer electrics, ſealing-wax, gum-lac, &c.; but it hath this bad quality, that, by rubbing it, ſome exceeding ſubtile ſteams are produced, which infect the perſon's clothes, and even his whole body, with a very diſagreeable ſmell, and will change ſilver in his pocket to a blackiſh colour.—The upper plate of the electrophorus is a braſs plate, or a board or piece of paſteboard covered with tinfoil or gilt paper, nearly of the ſame ſize with the electric plate, though it will not be the worſe that it is ſomewhat larger. It is furniſhed with a glaſs handle (I), which ought to be ſcrewed into the centre. The manner of uſing this machine is as follows.—Firſt, the plate B is excited by rubbing its coated ſide with a piece of new white flannel, or a piece of hare's ſkin. Even a common hard bruſh, having the hair a little greaſed, will excite ſulphur extremely well. When this plate is excited as much as poſſible, it is ſet upon the table with the electric ſide uppermoſt. Secondly, the metal plate is laid upon the excited electric, as repreſented in the figure. Thirdly, the metal plate is touched with the finger or any other conductor, which, on touching the plate, receives a ſpark from it. Laſtly, the metal plate A, being held by the extremity of its glaſs handle (I), is ſeparated from the electric plate; and, after it is elevated above that plate, it will be found ſtrongly electrified with an electricity contrary to that of the electric plate; in which caſe, it will give a very ſtrong ſpark to any conductor brought near it. By ſetting the metal upon the electric plate, touching it with the finger, and ſeparating it ſucceſſively, a great number of ſparks may be obtained apparently of the ſame ſtrength, and that without exciting again the electric plate. If theſe ſparks are repeatedly given to the knob of a coated phial, this will preſently become charged.

107 Mr Cavallo's obſervations.

“As to the continuance of the virtue of this electric plate, (ſays Mr Cavallo), when once excited, without repeating the excitation, I think there is not the leaſt foundation for believing it perpetual, as ſome gentlemen have ſuppoſed; it being nothing more than an excited electric, it muſt gradually loſe its power by imparting continually ſome of its electricity to the air, or other ſubſtances contiguous to it. Indeed its electricity, although it could never be proved to be perpetual by experiments, laſts a very long time, it having been obſerved to be pretty ſtrong ſeveral days, and even weeks, after excitation. The great duration of the electricity of this plate, I think, depends upon two cauſes: firſt, becauſe it does not loſe any electricity by the operation of putting the metal plate upon it, &c.

and, ſecondly, becauſe of its flat figure, which expoſes it to a leſs quantity of air, in compariſon with a ſtick of ſealing-wax, or the like, which, being cylindrical, expoſes its ſurface to a greater quantity of air, which is continually robbing the excited electrics of their virtue.

“ The firſt experiments that I made, relative to this machine, were with a view to diſcover which ſubſtance would anſwer beſt for coating the glaſs plate, in order to produce the greateſt effect. I tried ſeveral ſubſtances either ſimple or mixed; and at laſt I obſerved, that the ſtrongeſt in power, as well as the eaſieſt, I could conſtruct, were thoſe made with the ſecond ſort of ſealing-wax, ſpread upon a thick plate of glaſs. A plate that I made after this manner, and no more than ſix inches in diameter, when once excited, could charge a coated phial ſeveral times ſucceſſively, ſo ſtrongly as to pierce a hole through a card with the diſcharge. Sometimes the metal plate, when ſeparated from it, was ſo ſtrongly electrified, that it darted ſtrong flaſhes to the table upon which the electric plate was laid, and even into the air, beſides cauſing the ſenſation of the ſpider's web upon the face brought near it, like an electric ſtrongly excited. The power of ſome of my plates is ſo ſtrong, that ſometimes the electric plate adheres to the metal when this is lifted up, nor will they ſeparate even if the metal plate is touched with the finger or other conductor. It is remarkable, that ſometimes they will not act well at firſt, but they may be rendered very good by ſcraping with the edge of a knife the ſhining or gloſſy ſurface of the wax. This ſeems analogous to the well-known property of glaſs, which is, that new cylinders or globes, made for electrical purpoſes, are often very bad electrics at firſt; but that they improve by being worked, *i. e.* by having their ſurface a little worn. Paper alſo has this property.

108 Experiments with the electrophorus.

“ If, after having excited the ſealing-wax, I lay the plate with the wax upon the table, and the glaſs uppermoſt, *i. e.* contrary to the common method; then, on making the uſual experiment of putting the metal plate on it, and taking the ſpark, &c. I obſerve it to be attended with the contrary electricity: that is, if I lay the metal plate upon the electric one, and, while in that ſituation, touch it with an inſulated body, that body acquires the poſitive electricity; and the metallic, removed from the electric plate, appears to be negative; whereas it would become poſitive, if laid upon the excited wax. This experiment, I find, anſwers in the ſame manner if an electric plate is uſed which has the ſealing-wax coating on both ſides, or one which has no glaſs plate.

“ If the braſs plate, after being ſeparated from, be preſented with the edge toward the wax, lightly touching it, and thus be drawn over its ſurface, I find that the electricity of the metal is abſorbed by the ſealing-wax, and thus the electric plate loſes part of its power; and if this operation is repeated five or ſix times, the electric plate loſes its power entirely, ſo that a new excitation is neceſſary in order to revive it.

“ If, inſtead of laying the electric plate upon the table, it is placed upon an electric ſtand, ſo as to be accurately inſulated, then the metal plate ſet on it, acquires ſo little electricity, that it can only be diſcovered with an electrometer; which ſhows, that the electricity of this plate will not be conſpicuous on one ſide of it, if the oppoſite ſide is not at liberty either to part with, or acquire more of the electric fluid. In conſequence of this experiment, and in order to aſcertain how the oppoſite ſides of the electric plate would be affected in different circumſtances, I made the following experiments.

“ Upon an electric ſtand E, (fig. 3. Plate CI.) I placed a circular tin-plate, nearly ſix inches in diameter, which by a ſlender wire H communicated with an electrometer of pith-balls G, which was alſo inſulated upon the electric ſtand F. I then placed the excited electric plate D of ſix inches and a quarter in diameter, upon the tin-plate, with the wax uppermoſt; and on removing my hand from it, the electrometer G, which communicated with the tin-plate, *i. e.* with the under ſide of the electric plate, immediately opened with negative electricity. If, by touching the electrometer, I took that electricity off, the electrometer did not afterwards diverge. But if now, or when the electrometer diverged, I preſented my hand open, or any other uninſulated conductor, at the diſtance of about one or two inches, over the electric plate, without touching it, then the pith-balls diverged; or, if they diverged before, came together, and immediately diverged again with poſitive electricity:—I removed the hand, and the balls came together;—approached the hand, and they diverged: and ſo on.

“ If, while the pith-balls diverged with negative electricity, I laid the metal plate, holding it by the extremity K of its glaſs handle, upon the wax, the balls came, for a little time, towards one another, but ſoon opened again with the ſame, *i. e.* negative electricity.

“ If, whilſt the metallic reſted upon the electric plate, I touched the former, the electrometer immediately diverged with poſitive electricity; which if, by touching the electrometer, I took off, the electrometer continued without divergence.—I touched the metal plate again, and the electrometer opened again; and ſo on for a conſiderable number of times, until the metal plate had acquired its full charge. On taking now the metal plate up, the electrometer G inſtantly diverged with ſtrong negative electricity.

“ I repeated the above-deſcribed experiments, with this only difference in the diſpoſition of the apparatus, *i. e.* I laid the electric plate D with the excited ſealing-wax upon the circular tin-plate, and the glaſs uppermoſt; and the difference in their reſult was, that where the electricity had been poſitive in the former diſpoſition of the apparatus, it now became negative, and *vice verſa*; except that, when I firſt laid the electric plate upon the tin, the electrometer G diverged with negative electricity, as well in this as in the other diſpoſition of the apparatus.

“ I repeated all the above experiments with an electric plate, which beſides the ſealing-wax coating on one ſide, had a ſtrong coat of varniſh on the other ſide, and their reſult was ſimilar to that of thoſe made with the above-deſcribed plate.”

109 Miſtakes in Mr Cavallo's obſervations.

This is Mr Cavallo's account of the electrophorus; but there is one part of it in which he muſt certainly be miſtaken. He tells us, that “ if inſtead of laying the electric plate upon the table, it is ſet upon an electric ſtand, ſo as to be accurately inſulated, then the metal plate ſet on it acquires ſo little electricity, that it can only be diſcovered by an electrometer.” In what manner this gentleman came to miſtake a plain fact ſo egregiouſly, is not eaſy to determine; but it is certain, that an electrophorus, inſtead of having its virtue impaired by being inſulated, has it greatly increaſed, at leaſt the ſphere of its activity is greatly enlarged. When lying on the table, if the upper plate is put upon it without being touched with the finger, it will not ſhew much ſign of electricity. But as ſoon as it is put on the electric ſtand, both the upper and under ſide appear ſtrongly negative. A thread will be attracted at the diſtance of eight or ten inches. If both the upper and under ſide are touched at the ſame time, a ſtrong ſpark will be obtained from both, but always of the ſame kind of electricity, namely, the negative kind. If the upper plate is now lifted up, a ſtrong ſpark of poſitive electricity will be obtained from it; and on putting it down again, two ſparks of negative electricity will be produced.

110 Singular appearance on inſulating an electrophorus.

The ſingularity of this experiment is, that it produces always double the quantity of negative electricity that it doth of the poſitive kind; which cannot be done by any other method yet known. Another very ſurpriſing circumſtance is, that when the electrophorus remains in its inſulated ſituation, you need not always touch the upper and under ſide of the plates at once, in order to procure poſitive electricity from the upper plate: It is ſufficient to touch both ſides only once. On lifting up the upper plate, a ſpark of poſitive electricity is obtained as already mentioned. On putting it down again, a ſpark of the negative kind is obtained from the upper plate, even though you do not touch the lower one. On lifting up the upper plate, a ſpark of poſitive electricity is obtained, but weaker than it would have been had both ſides been touched at once. Putting down the upper plate again without touching both, a ſtill weaker ſpark firſt of negative and then of poſitive electricity will be obtained from the upper one. Thus, the ſparks will go on continually diminiſhing, to the number perhaps of two or three hundred. But at laſt, when the electricity of the whole machine ſeems to be totally loſt, if both ſides are touched at once, it will inſtantly be reſtored to its full ſtrength, and the double ſpark of negative, with the ſingle one of poſitive electricity, will be obtained without intermiſſion as before.

111 General reaſon of all the phenomena.

To account for all theſe phenomena very particularly, is perhaps impoſſible, without a greater degree of knowledge concerning the internal fabric of bodies than we have acceſs to attain. In general, however, it is evident, that the phenomena of the electrophorus ariſe from the diſpoſition that the electric matter hath to keep up an equilibrium within itſelf throughout every part of the univerſe. In conſequence of this, no motion of the electric matter can be produced upon the one ſide of a body, but it muſt immediately be balanced by a correſponding one on the oppoſite ſide; and in proportion to the ſtrength of the one, ſo will the ſtrength of the other be. When the under plate of the electrophorus is excited, the negative electricity, or vibratory action of the electric matter towards the excited ſide, is produced; and the moment that ſuch an action is produced on one ſide, it is reſiſted by a ſimilar one on the oppoſite ſide, and thus the electrophorus becomes negatively electrified on both ſides. As long as the under part of the machine communicates with the earth, the vibratory motion is impeded by the progreſſive one towards the earth. This makes the reſiſtance on the under ſide leſs, and therefore the vibratory motion on the upper part extends but a ſmall way. When the plate is inſulated, the electric matter has not an opportunity of eſcaping to the earth as before, becauſe it is ſtrongly reſiſted by the air; a vibration therefore takes place on both ſides, and extends to a great diſtance from the plate. When the upper plate is ſet upon the electrophorus, the ſame kind of electricity, *viz.* the negative kind, is communicated to it. When both ſides are touched, with the finger, or with any other conducting ſubſtance, both electricities are ſuddenly taken off, becauſe the electric matter running along the conducting ſubſtance on both ſides, puts an end to the vibratory motion in the air, which conſtitutes the very eſſence of what we call *electricity*. There is now a quiet and equal balance of the electric matter on both ſides, and therefore no ſigns of electricity are ſhewn. But as ſoon as the upper plate is taken off, this balance is deſtroyed. The fluid in the metal plate had not been able to penetrate the electric ſubſtance in ſuch a manner as to put a ſtop to the vibrations of what was within it. As ſoon then as the plate is taken off, the electricity, or vibratory motion towards the electric, breaks out at that ſide. But this motion *inwards* to the electric, which conſtitutes negative electricity, neceſſarily becomes *outward* from the plate; and as no motion of the fluid can be produced on one ſide of a body, but what is immediately communicated to the other, the upper plate becomes electrified poſitively, and the under one negatively on both ſides.

Sect. VII. *Miſcellaneous Experiments.*

In this ſection are comprehended ſome of thoſe effects of the electric matter which may properly be reckoned *anomalous*, and for which it is impoſſible to aſſign any reaſon. Some very remarkable ones of this kind are thoſe on colours, of which Mr Cavallo gives the following account. "Having accidentally obſerved, that an electric ſhock ſent over the ſurface of a card, marked a black ſtroke upon a red ſpot of the card, I was from this induced to try what would be the effect of ſending ſhocks over cards painted with different water-colours. Accordingly, I painted ſeveral cards with almoſt every colour I had, and ſent ſhocks (A) over them, when they were very dry; making uſe of the univerſal diſcharger, fig. 5. Plate XCIX. The effects were as follow.

112 Mr Cavallo's experiments on colours.

Vermilion was marked with a ſtrong black track, about one tenth of an inch wide. This ſtroke is generally ſingle, as repreſented by A B, fig. 17. of Plate XCIX. Sometimes it is divided in two towards the middle, like E F; and ſometimes, particularly when the wires are ſet very diſtant from one another, the ſtroke is not continued, but interrupted in the middle, like G H. It often, although not always, happens, that the impreſſion is marked ſtronger at the extremity of that wire, from which the electric fluid iſſues, as it appears at E, ſuppoſing that the wire C communicates with the poſitive ſide of the jar; whereas the extremity of the ſtroke, contiguous to the point of the wire

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(A) The force generally employed was the full charge of one foot and a half of coated glaſs.

wire D, is neither ſo ſtrongly marked, nor ſurrounds the wire ſo much, as the other extremity E.

"Carmine received a faint and ſlender impreſſion of a purple colour.

"Verdigreaſe was ſhook off from the ſurface of the card; except when it had been mixed with ſtrong gum-water, in which caſe it received a very faint impreſſion.

"White-lead was marked with a long black track, not ſo broad as that on vermilion.

"Red lead was marked with a faint mark much like carmine.

"The other colours I tried were orpiment, gamboge, ſap-green, red ink, ultramarine, Pruſſian blue, and a few others, which were compounds of the above; but they received no impreſſion.

"It having been inſinuated, that the ſtrong black mark, which vermilion receives from the electric ſhock, might poſſibly be owing to the great quantity of ſulphur contained in that mineral, I was induced to make the following experiment. I mixed together equal quantities of orpiment and flower of ſulphur; and with this mixture, by the help, as uſual, of very diluted gum-water, I painted a card; but the electric ſhock ſent over it left not the leaſt impreſſion.

"Deſirous of carrying this inveſtigation on colours a little further, with a particular view to determine ſomething relative to the properties of lamp-black and oil (B), I procured ſome pieces of paper painted on both ſides with oil colours; and ſending the charge of two feet of coated glaſs over each of them, by making the interruption of the circuit upon their ſurfaces, I obſerved that the pieces of paper painted with lamp-black, Pruſſian blue, vermilion, and purple brown, were torn by the exploſion; but white lead, Naples yellow, Engliſh ochre, and verdigreaſe, remained unhurt.

"The ſame ſhock ſent over a piece of paper painted very thickly with lamp-black and oil left not the leaſt impreſſion. I ſent the ſhock alſo over a piece of paper unequally painted with purple brown, and the paper was torn where the paint lay very thin, but remained unhurt where the paint was evidently thicker. Theſe experiments I repeated ſeveral times and with ſome little variation, which naturally produced different effects; however, they all ſeem to point out the following propoſitions.

"I. A coat of oil-paint over any ſubſtance, defends it from the effects of ſuch an electric ſhock, as would otherwiſe injure it; but by no means defends it from any electric ſhock whatever. II. No one colour ſeems preferable to the others, if they are equal in ſubſtance, and equally well mixed with oil; but a thick coating does certainly afford a better defence than a thinner one.

"By rubbing the abovementioned pieces of paper, I find that the paper painted with lamp-black and oil is more eaſily excited, and acquires a ſtronger electricity, than the papers painted with the other colours; and, perhaps, on this account it may be, that lamp-black and oil might reſiſt the ſhock ſomewhat better than the other paints.

"It is remarkable, that vermilion receives the black impreſſion, when painted with linſeed oil, nearly as well as when painted with water. The paper painted with white lead and oil, receives alſo a black mark; but its nature is very ſingular. The track, when firſt made, is almoſt as dark as that marked on white-lead, painted with water; but it gradually loſes its blackneſs, and in about an hour's time (or longer, if the paint is not freſh), it appears without any darkneſs, and when the painted paper is laid in a proper light, appears only marked with a colourleſs track, as if made by a finger-nail. I ſent the ſhock alſo over a piece of board, which had been painted with white-lead and oil about four years before, and the exploſion marked the black track upon this alſo: this track, however, was not ſo ſtrong, nor vaniſhed ſo ſoon, as that marked upon the painted paper; but in about two days time, it alſo vaniſhed entirely."

113
Electric ſhock calcines, vitrifies, and revivifies metals.

Another very remarkable property of the electric fluid is, that it both calcines, vitrifies, and revivifies, metals. The calcination of them appears from Dr Prieſtley's experiments with the braſs chain, mentioned n° 75. where the black duſt was plainly a calx of the metal.—The vitrification is performed by exploding ſmall wires of any kind with the ſhock of a battery. In this caſe, the ſmall globules of metal, even though gold, ſilver, or platina, are found to be completely vitrified.—The revivification is an experiment of Mr Beccaria. This he did by making the exploſion between two pieces of the calces; and thus he revivified ſeveral metallic ſubſtances, particularly zinc, and even produced real quickſilver from cinnabar. In this caſe, he always obſerved ſtreaks of black beyond the coloured metallic ſtains; owing, as he ſuppoſed, to the phlogiſton driven from the parts that were vitrified, when the other part revivified the calx.

114
Mr Beccaria's experiments to ſhew that the electric matter throws light conducting ſubſtances before it.

Mr Beccaria alſo diſcovered another very remarkable property of the electric matter; namely, that when it is obliged to paſs through air, or any other ſubſtance through which it makes its way with difficulty, it throws before it all light conducting ſubſtances it can find, in order to facilitate its own paſſage; and thus it will paſs through a greater quantity of reſiſting medium than it would otherwiſe be able to do. The experiments from which Mr Beccaria drew this concluſion, were the following. He put a narrow piece of leaf-ſilver between two plates of wax, laying it acroſs them, but ſo that it did not quite reach one of the ſides. The diſcharge being made through this ſtrip of metal, by bringing a wire oppoſite to the ſilver, at the place where it was diſcontinued; the ſilver was found melted, and part of it diſperſed all along the track, that the electric matter took between the plates of wax, from the ſilver to the wire. Happening once to receive, inadvertently, the charge of a ſmall jar through ſome ſmoke of ſpirit of nitre, a hole was made in his thumb, where the fire entered, and which he thought could only have been made by the acid carried along by the electric fluid. Dr Prieſtley hath made ſeveral more experiments, in order to aſcertain this remarkable property,

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(B) "It has often been obſerved, that when lightning has ſtruck the maſts of ſhips, it has paſſed over ſuch parts of the maſts as were covered with lamp-black and tar, or painted with lamp black and oil, without the leaſt injury, at the ſame time that it has ſhivered the uncoated parts in ſuch a manner as to render the maſts uſeleſs." For a particular account of ſuch facts, ſee the article THUNDER.

115
Dr Prieſtley's experiments on this ſubject.

perty, and of which he gives the following account.

“ I diſcharged frequent ſhocks, both of a common jar, and another of three ſquare feet, through trains of braſs duſt, laid on a ſtool of baked wood, making interruptions in various parts of the train; and always found the braſs duſt ſcattered in the intervals, ſo as to connect the two diſjoined ends of the train; but then it was likewiſe ſcattered nearly as much from almoſt all other parts of the train, and in all directions. The ſcattering from the train itſelf was probably occaſioned by ſmall electric ſparks between the particles of the duſt; which, cauſing a vacuum in the air, drove all that light matter to a conſiderable diſtance. But the particles of the duſt, which were ſtrowed in the intervals of the train, ſome of which were at leaſt three inches, could hardly be conveyed in that manner.

“ When ſmall trains were laid, the diſperſion was the moſt conſiderable, and a light was very viſible in the dark, illuminating the whole circuit. It made no difference, in any of theſe experiments, which way the ſhock was diſcharged.

“ When I laid a conſiderable quantity of the duſt at the ends of two pieces of chain, through which the ſhock paſſed, at the diſtance of about three inches from one another, the duſt was always diſperſed over the whole interval, but chiefly laterally; ſo that the greateſt quantity of it lay in arches, extending both ways, and leaving very little of it in the middle of the path. It is probable, that the electric power would have ſpread it equably, but that the vacuum made in the air, by the paſſage of the fluid from one heap of duſt to the other, diſperſed it from the middle part.

“ I then inſulated a jar of three ſquare feet, and upon an adjoining glaſs-ſtand laid a heap of braſs duſt; and at the diſtance of ſeven or eight inches a braſs rod communicating with the outſide of the jar. Upon bringing another rod, communicating with the inſide, upon the heap of duſt, it was diſperſed in a beautiful manner, but not one way more than another. However, it preſently reached the rod communicating with the outſide.

“ Making two heaps, about eight inches aſunder, I brought one rod communicating with the inſide upon one of them, and another rod communicating with the outſide upon the other. Both the heaps were diſſperſed in all directions, and ſoon met; preſently after which the jar was diſcharged, by means of this diſperſed duſt, in one full exploſion. When the two heaps were too far aſunder to promote a full diſcharge at once, a gradual diſcharge was made thro' the ſcattered particles of the duſt.

“ When one heap of duſt was laid in the centre of the ſtand, and the two rods were made to approach on each ſide of it, they each attracted the duſt from the ſide of the heap next to them, and repelled it again in all directions. When they came very near the heap, the diſcharge was made through it, without giving it any particular motion.

“ All theſe experiments ſhow, that light bodies, poſſeſſed of a conſiderable ſhare of electricity, diſperſe in all directions, carrying the electric matter to places not abounding with it; and that they ſometimes promote a ſudden diſcharge of great quantities of that matter from places where it was lodged, to places where there was a defect of it. But an accident led me to a much more beautiful, and perhaps a more ſatisfactory manner of demonſtrating the laſt part of this propoſition, than any that I hit upon while I was purſuing my experiments with that deſign.

“ Hanging a drop of water upon the knob of a braſs rod communicating with the inſide of my battery, in order to obſerve what variety it might occaſion in the circular ſpots abovementioned, I was greatly ſurpriſed to find the exploſion made all at once, at the diſtance of two inches.

“ I afterwards put ſome braſs duſt upon a plate of metal communicating with the inſide of the battery; and making the diſcharge thro' the duſt, it exploded at the diſtance of an inch and a half. The duſt roſe towards the diſcharged rod, and from thence was diſperſed in all directions.

“ Theſe experiments are the more remarkable, as they demonſtrate ſo great a difference between the diſtance at which the battery may be made to diſcharge at once, by the help of theſe light bodies, and without them. When the diſcharge of a battery by the knobs of braſs rods, in the open air, is at the diſtance of about half an inch; it will, by this means, be made at about two inches.”

116
Experiments concerning the velocity of the electric fluid.

The motions of the electric fluid, though prodigiouſly quick, are not inſtantaneous. The ſhock of the Leyden phial, indeed, hath been tranſmitted through wires of ſeveral miles in length, without taking up any ſenſible ſpace of time. That is, ſuppoſing two perſons to hold the ends of the wire, one communicating with the knob, and the other with the outſide coating of the phial, both would feel the ſhock at the ſame inſtant; nor would it make any alteration though a conſiderable part of the ſurface of the ground was made part of the conductor. Dr Prieſtley relates ſeveral very curious experiments made with a view to aſcertain this point ſoon after the Leyden phial was diſcovered. Theſe experiments were planned and directed by Dr Watſon, who was preſent at every one of them. His chief aſſiſtants were Martin Folkes, Eſq; preſident of the royal ſociety, Lord Charles Cavendiſh, Dr Bevis, Mr Graham, Dr Birch, Mr Peter Daval, Mr Trembley, Mr Ellicott, Mr Robins, and Mr Short. Many other perſons, and ſome of diſtinction, gave their attendance occaſionally.

Dr Watſon, who wrote the hiſtory of their proceedings, in order to lay them before the royal ſociety, begins with obſerving (what was verified in all their experiments), that the electric ſhock is not, ſtrictly ſpeaking, conducted in the ſhorteſt manner poſſible, unleſs the bodies through which it paſſes conduct equally well; for that, if they conduct unequally, the circuit is always formed through the beſt conductors, though the length of it be ever ſo great.

The firſt attempt theſe gentlemen made, was to convey the electric ſhock acroſs the river Thames, making uſe of the water of the river for one part of the chain of communication. This they accompliſhed on the 14th and 18th of July 1747, by faſtening a wire all along Weſtminſter bridge, at a conſiderable height above the water. One end of this wire communicated with the coating of a charged phial, the other being held by an obſerver, who, in his other hand, held an iron rod, which he dipped into the river. On the oppoſite

Miſcellaneous Experiments.

poſite ſide of the river, ſtood a gentleman, who likewiſe dipped an iron rod in the river with one hand; and in the other held a wire, the extremity of which might be brought into contact with the wire of the phial.

Upon making the diſcharge, the ſhock was felt by the obſervers on both ſides the river, but more ſenſibly by thoſe who were ſtationed on the ſame ſide with the machine; part of the electric fire having gone from the wire down the moiſt ſtones of the bridge, thereby making ſeveral ſhorter circuits to the phial, but ſtill all paſſing through the gentlemen who were ſtationed on the ſame ſide with the machine. This was, in a manner, demonſtrated by ſome perſons feeling a ſenſible ſhock in their arms and feet, who only happened to touch the wire at the time of one of the diſcharges, when they were ſtanding upon the wet ſteps which led to the river. In one of the diſcharges made upon this occaſion, ſpirits were kindled by the fire which had gone through the river.

Upon this, and the ſubſequent occaſions, the gentlemen made uſe of wires, in preference to chains, for this, among other reaſons, that the electricity which was conducted by chains was not ſo ſtrong as that which was conducted by wires. This, as they well obſerved, was occaſioned by the junctures of the links not being ſufficiently cloſe, as appeared by the ſnapping and flaſhing at every juncture where there was the leaſt ſeparation. Theſe leſſer ſnappings, being numerous in the whole length of a chain, very ſenſibly leſſened the great diſcharge at the gun-barrel.

Their next attempt was to force the electrical ſhock to make a circuit of two miles, at the New River at Stoke Newington. This they performed on the 24th of July 1747, at two places; at one of which the diſtance by land was 800 feet, and by water 2000: in the other, the diſtance by land was 2800 feet, and by water 8000. The diſpoſition of the apparatus was ſimilar to what they before uſed at Weſtminſter bridge, and the effect anſwered their utmoſt expectations. But as, in both caſes, the obſervers at both extremities of the chain, which terminated in the water, felt the ſhock, as well when they ſtood with their rods fixed into the earth 20 feet from the water, as when they were put into the river; it occaſioned a doubt, whether the electric circuit was formed through the windings of the river, or, a much ſhorter way, by the ground of the meadow: for the experiment plainly ſhewed, that the meadow-ground, with the graſs on it, conducted the electricity very well.

By ſubſequent experiments they were fully convinced, that the electricity had not in this caſe been conveyed by the water of the river, which was two miles in length; but by land, where the diſtance was only one mile; in which ſpace, however, the electric matter muſt neceſſarily have paſſed over the New River twice, have gone through ſeveral gravel pits, and a large ſtubble field.

July 28th, they repeated the experiment at the ſame place, with the following variation of circumſtances. The iron wire was, in its whole length, ſupported by dry ſticks, and the obſervers ſtood upon original electrics; the effect of which was, that they felt the ſhock much more ſenſibly than when the conducting wire had lain upon the ground, and when the obſervers had likewiſe ſtood upon the ground, as in the former experiment.

Afterwards, every thing elſe remaining as before, the obſervers were directed, inſtead of dipping their rods into the water, to put them into the ground, each 150 feet from the water. They were both ſmartly ſtruck, though they were diſtant from each other above 500 feet.

The ſame gentlemen, pleaſed with the ſucceſs of their former experiments, undertook another, the object of which was, to determine whether the electric virtue could be conveyed through dry ground; and, at the ſame time, to carry it through water to a greater diſtance than they had done before. For this purpoſe, they pitched upon Highbury-barn beyond Iſlington, where they carried it into execution on the 5th of Auguſt 1747. They choſe a ſtation for their machine, almoſt equally diſtant from two other ſtations for obſervers upon the New River; which were ſomewhat more than a mile aſunder by land, and two miles by water. They had found the ſtreets of London, when dry, to conduct very ſtrongly, for about 40 yards; and the dry road at Newington about the ſame diſtance. The event of this trial anſwered their expectations. The electric fire made the circuit of the water, when both the wires and the obſervers were ſupported upon original electrics, and the rods dipped into the river. They alſo both felt the ſhock, when one of the obſervers was placed in a dry gravelly pit, about 300 yards nearer the machine than the former ſtation, and 100 yards diſtant from the river: from which the gentlemen were ſatisfied, that the dry gravelly ground had conducted the electricity as ſtrongly as water.

From the ſhocks which the obſervers received in their bodies, when the electric power was conducted upon dry ſticks, they were of opinion, that, from the difference of diſtance ſimply conſidered, the force of the ſhock, as far as they had yet experienced, was very little if at all impaired. When the obſervers ſtood upon electrics, and touched the water, or the ground, with the iron rods, the ſhock was always felt in their arms or wriſts; when they ſtood upon the ground with their iron rods, they felt the ſhock in their elbows, wriſts, and ankles; and when they ſtood upon the ground without rods, the ſhock was always felt in the elbow and wriſt of that hand which held the conducting wire, and in both ankles.

The laſt attempt of this kind which theſe gentlemen made, and which required all their ſagacity and addreſs in the conduct of it, was to try whether the electric ſhock was perceptible at twice the diſtance to which they had before carried it, in ground perfectly dry, and where no water was near; and alſo to diſtinguiſh, if poſſible, the reſpective velocity of electricity and ſound.

For this purpoſe they fixed upon Shooter's-hill, and made their firſt experiments on the 14th of Auguſt 1747; a time when, as it happened, but one ſhower of rain had fallen during five preceding weeks. The wire communicating with the iron rod, which made the diſcharge, was 6732 feet in length, and was ſupported all the way upon baked ſticks; as was alſo the wire which communicated with the coating of the phial, which was 3868 feet long, and the obſervers were diſtant from each other two miles. The reſult of the exploſion demonſtrated, to the ſatisfaction of the gentlemen preſent, that the circuit performed by the electric matter was four miles, *viz.* two miles of wire, and two of dry ground, the ſpace between the extremities of the wires; a diſtance which, without trial, as they juſtly obſerved, was too great to be credited. A gun was diſcharged at the inſtant of the exploſion, and the obſervers had ſtop-watches in their hands, to note the moment when they felt the ſhock: but, as far as they could diſtinguiſh, the time in which the electric matter performed that vaſt circuit might have been inſtantaneous.

In all the exploſions where the circuit was made of conſiderable length, it was obſerved, that though the phial was very well charged, yet that the ſnap at the gun-barrel, made by the exploſion, was not near ſo loud as when the circuit was formed in a room; ſo that a by-ſtander, ſays Dr Watſon, though verſed in theſe operations, would not imagine, from ſeeing the flaſh, and hearing the report, that the ſtroke at the extremity of the conducting wire could have been conſiderable; the contrary whereof, when the wires were properly managed, he ſays, always happened.

Still the gentlemen, unwearied in theſe purſuits, were deſirous, if poſſible, to aſcertain the abſolute velocity of electricity at a certain diſtance; becauſe, though in the laſt experiment, the time of its progreſs was certainly very ſmall if any, they were deſirous of knowing, ſmall as that time might be, whether it was meaſurable; and Dr Watſon had contrived an excellent method for that purpoſe.

Accordingly, on the 5th of Auguſt 1648, the gentlemen met once more, and the laſt time, at Shooter's-hill; when it was agreed to make an electric circuit of two miles, by ſeveral turnings of the wire in the ſame field. The middle of this circuit, they contrived to be in the ſame room with the machine, where an obſerver took in each hand one of the extremities of the wires, each of which was a mile in length. In this excellent diſpoſition of the apparatus, in which the time between the exploſion and the ſhock might have been obſerved to the greateſt exactneſs, the phial was diſcharged ſeveral times; but the obſerver always felt himſelf ſhocked at the very inſtant of making the exploſion. Upon this the gentlemen were fully ſatisfied, that through the whole length of this wire, which was 12,276 feet, the velocity of the electric matter was inſtantaneous.

117 Sometimes the fluid ſeems to move more ſlowly.

With all this ſurpriſing velocity, however, it is certain, that both ſides of a charged phial may be touched ſo quickly, even by the beſt conductors, that all the electric matter hath not time to make the circuit, and the phial will remain but half diſcharged. If the upper plate of an electrophorus alſo is very ſuddenly touched with the finger, or any other conductor, a very ſmall ſpark will be obtained on lifting it up; though a very ſtrong one would be got if the finger was kept longer upon it. But how this ſeeming ſlowneſs can be reconciled with the immeaſurable velocity above-mentioned, doth not appear. It is certain, indeed, that this fluid is conſiderably reſiſted in its paſſage through, or over, every ſubſtance. It will even prefer a ſhort paſſage in the air where it is violently reſiſted, to one along a wire of very great length; but here, as in every other caſe, it ſeems to divide its force, and to break out through ſeveral different paſſages at once. A method of aſcertaining this hath been contrived by Dr Prieſtley, thus. Bend a wire, about five feet long, in the form repreſented Plate C. fig. 17. ſo that the parts A B may come within half an inch of one another; then connect the extremities of the wire with the hook of the battery, and ſend a ſhock through it. On making the exploſion, a ſpark will be ſeen between A and B; which ſhews that the fluid chooſes a ſhort paſſage through the air, rather than the long one through the wire. The charge, however, does not paſs entirely between A and B, but part of it goes alſo through the wire. This may be proved by putting a ſlender wire between A and B: for, on making the diſcharge with only this addition in the apparatus, the ſmall wire will hardly be made red hot; whereas, if the large wire A D B be cut in D, ſo as to diſcontinue the circuit A D B, the ſmall wire will be melted, and even exploded, by the ſame ſhock that before made it ſcarcely red hot.—But though we can eaſily ſhew that the electric fluid always meets with reſiſtance, it is by no means eaſy to ſhew why the ſame reſiſtance which puts a temporary ſtop to its motions in ſome caſes, doth not ſo in all.

118 Water becomes electric by cold.

Another curious experiment in electricity is the converting of conducting ſubſtances into electrics by cold, and of changing electrics into conductors by heat. The firſt hath yet been done only in the inſtance of water. This is a diſcovery of Mr Achard's at Berlin, who, in the month of January 1776, obſerved, that water frozen to the 20th degree below the freezing point of Reaumur's thermometer, anſwering to the 13th below 0 of Fahrenheit's, is an electric. He tried his experiments in the open air, where he found, that a rod of ice two feet long, and two inches thick, was a very imperfect conductor when Reamur's thermometer was at ſix degrees below 0; and that it would not in the leaſt conduct when the thermometer was ſunk to 20°. By whirling a ſpheroid of ice in a proper machine, he even electrified the prime conductor ſo as to attract, repel, give ſparks, &c. The ice made uſe of was free from air-bubbles, and quite tranſparent; to produce which, he uſed to ſet a veſſel containing diſtilled water to be frozen, upon the window of a room which was rather warm with reſpect to the ambient air; ſo that the water began to freeze on the one ſide of the veſſel, while on the other it was ſtill liquid.

118 Electrics become conductors by heat.

To prove that glaſs and other electrics become conductors when very hot: Take a ſmall glaſs tube of about one twentieth of an inch in diameter, and above a foot long; cloſe it at one end, and introduce a wire into it, ſo that it may be extended through its whole length; let two or three inches of this wire project above the open end of the tube, and there faſten it with a bit of cork; tie round the cloſed end of the tube another wire, which will be ſeparated from the wire within the tube only by the glaſs interpoſed between them. In theſe circumſtances, endeavour to ſend a ſhock through the two wires, *i. e.* the wire inſerted in the glaſs tube, and that tied on its outſide, by connecting one of them with the outſide, and touching the other with the knob of a charged jar; and you will find that the diſcharge cannot be made, unleſs the tube be broken; becauſe the circuit is interrupted by the glaſs at the end of the tube, which is interpoſed between the two wires. But put that end of the tube to which the wire is tied into

Plate CI.

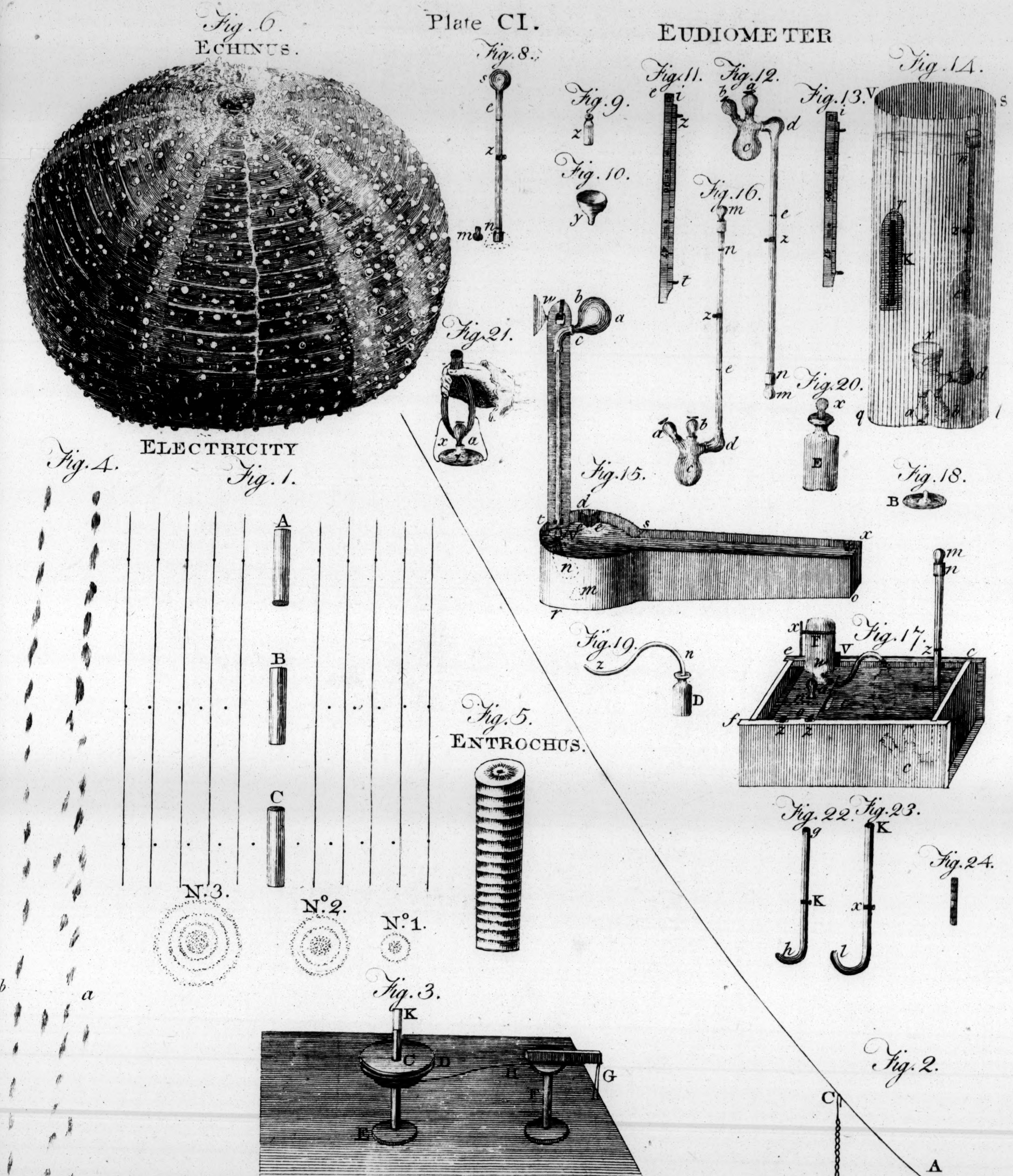
Fig. 6.
ECHINUS.
EUDIOMETER
Fig. 8.
Fig. 9.
Fig. 10.
Fig. 11.
Fig. 12.
Fig. 13.
Fig. 14.
Fig. 15.
Fig. 16.
Fig. 17.
Fig. 18.
Fig. 19.
Fig. 20.
Fig. 21.
Fig. 22.
Fig. 23.
Fig. 24.
ELECTRICITY
Fig. 1.
Fig. 2.
Fig. 3.
Fig. 4.
Fig. 5.
ENTROCHUS.
N.3.
N°2.
N°1.
A
B
C
D
E
F
G
H
I
K
a
b
c
d
e
i
l
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q
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A. Bell Sculp^t.

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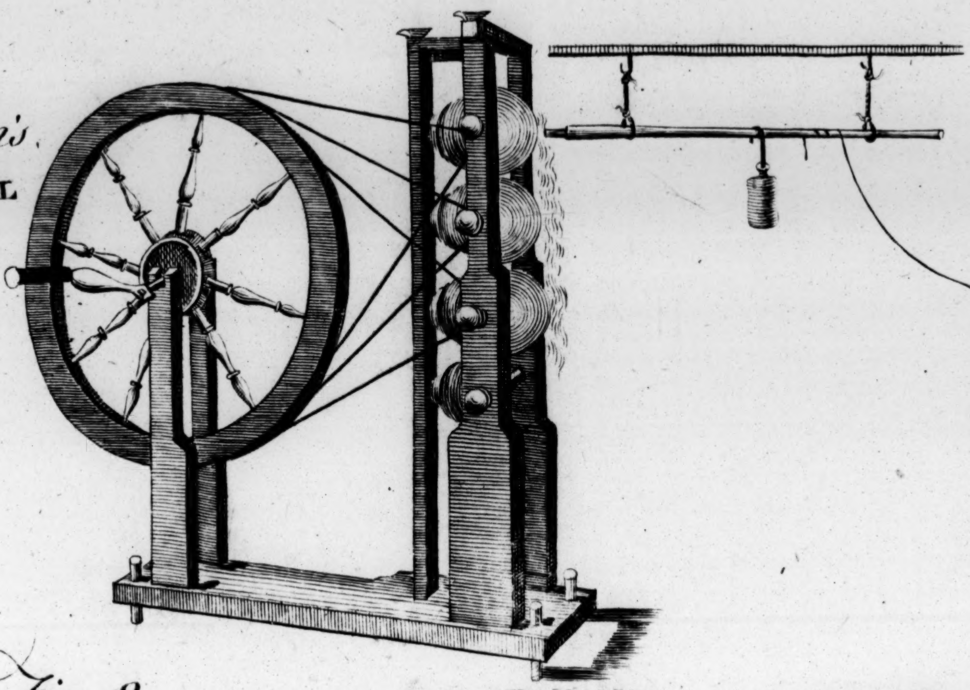
Fig. 1.
Dr Walson's
ELECTRICAL
MACHINE



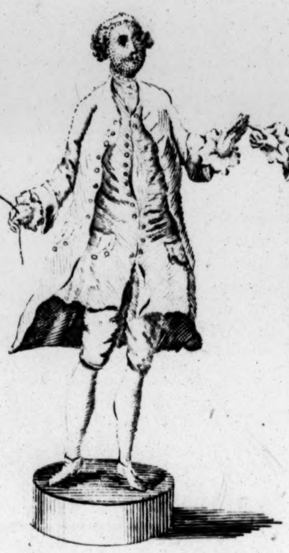


Fig. 2.
CLOUD
MACHINE

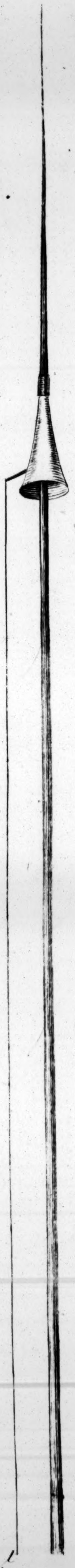


Fig. 3.
ELEPHAS *or* ELEPHANT

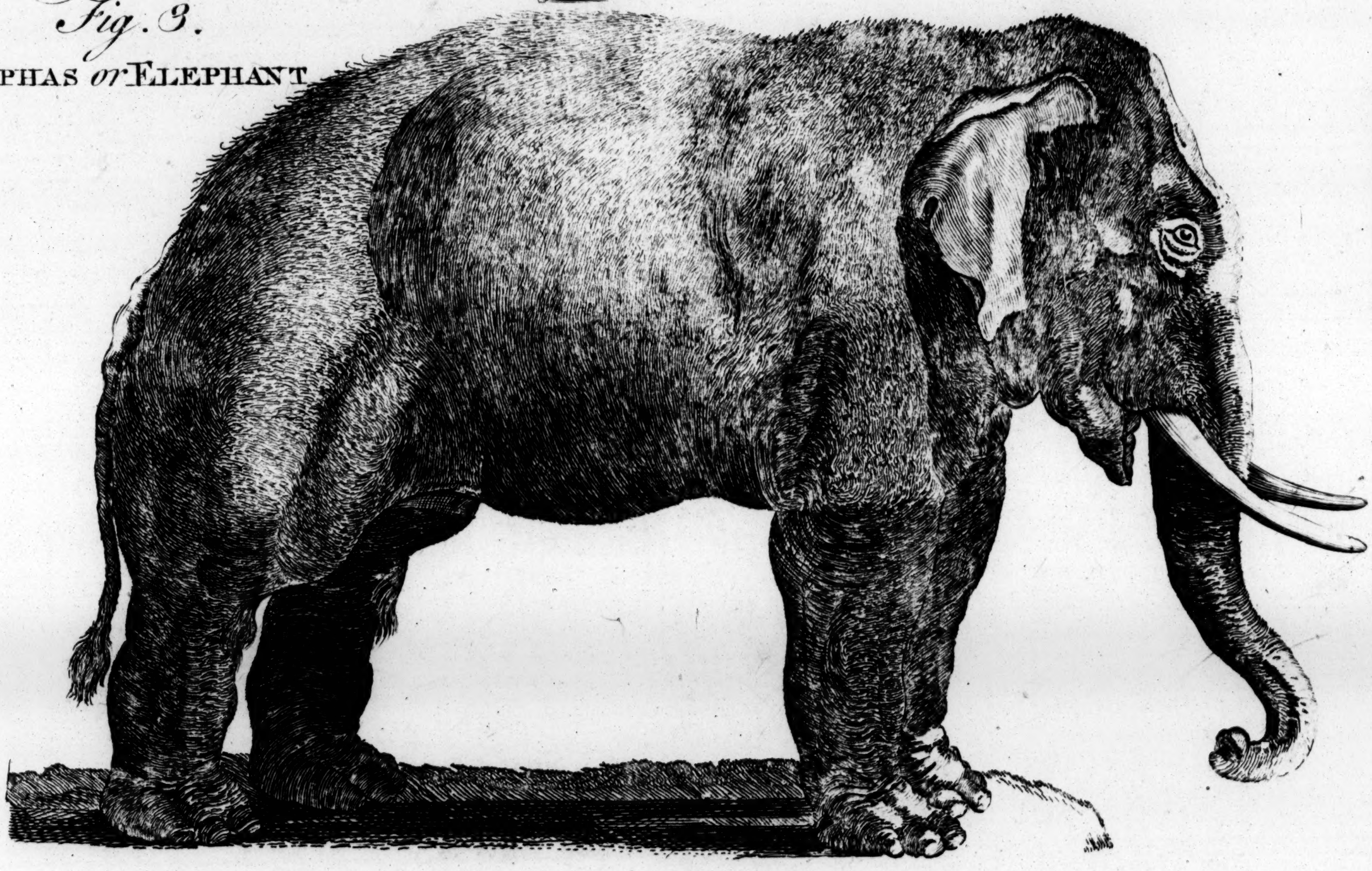


Fig. 4. ECHENEIS

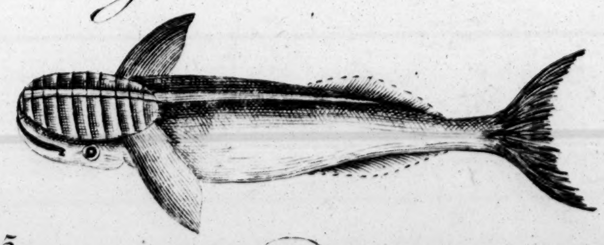


Fig. 7.
EXOCŒTUS VOLANS,
or Flying Fish.

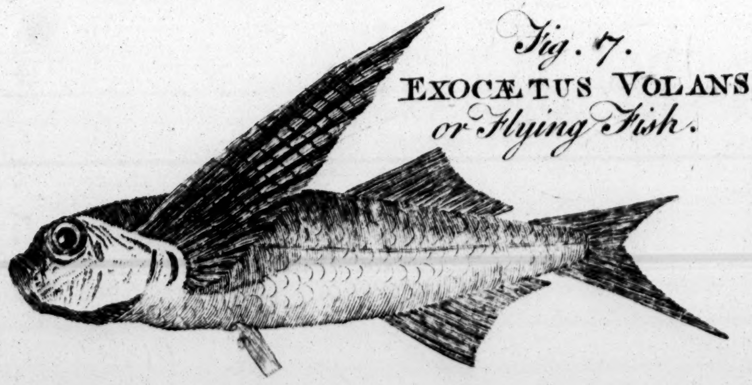


Fig. 5.
ELATER.

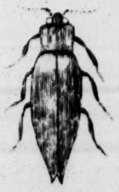
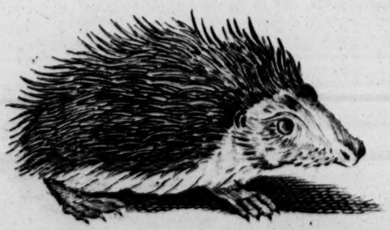


Fig. 6. ERINACEUS *or* HEDGE HOG



A.Bell Sculpt.

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Miſcellaneous Experiments.

into the fire, ſo that it may become juſt red-hot, then endeavour to diſcharge the jar again through the wires, and you will find that the exploſion will be eaſily tranſmitted from wire to wire through the ſubſtance of the glaſs, which, by being made red-hot, is become a conductor.

In order to aſcertain the conducting quality of hot reſinous ſubſtances, oils, &c. bend a glaſs tube in the form of an arch C E F D, fig. 16. Plate XCIX; and tie a ſilk ſtring G C D to it, which ſerves to hold it by when it is to be ſet near the fire; fill the middle part of this tube with roſin, ſealing-wax, &c. then introduce two wires A E, B F, through its ends, ſo that they may touch the roſin, or penetrate a little way in it. This done, let a perſon hold the tube over a clear fire, ſo as to melt the roſin within it; at the ſame time, by connecting one of the wires A or B with the outſide of a charged jar, and touching the other with the knob of the jar, endeavour to make the diſcharge through the roſin, and you will obſerve, that while the roſin is cold, no ſhocks can be tranſmitted through it; but it becomes a conductor according as it melts; and when totally melted, then the ſhocks will paſs through it very freely.

To ſhow that hot air is a conductor, electrify one of the cork-ball electrometers ſuſpended upon the ſtand fig. 7. of Plate XCIX. or electrify the prime conductor with the quadrant electrometer; then bring a red-hot iron within a ſufficient diſtance of the electrometer or prime conductor, and you will find that they ſoon loſe their electricity, which is certainly conducted by the hot air contiguous to the iron; for if the experiment be repeated with the ſame iron when cold, *i. e.* by bringing it within the ſame diſtance of the electrified electrometer or prime conductor, their electricity will not be conducted away as before. It has been obſerved, that a battery may be diſcharged by introducing a red-hot iron between two knobs interpoſed, and ſtanding at ſome diſtance from each other in the circuit: but if, inſtead of iron, there be introduced a piece of red-hot glaſs between the knobs, (the diſtance between them remaining as at firſt), the battery cannot be diſcharged: whence we may infer, that either hot air is not ſo good a conductor as has been imagined; or elſe, that air heated by iron is ſtronger with reſpect to its conducting power, than when heated by the red-hot glaſs.

Miſcellaneous Experiments.

Beſides theſe, there are a number of other anomalous appearances exhibited by the electric fluid. Some of the principal of them are the phenomena of the TOURMALIN, the GYMNOTUS *Electricus*, TORPEDO, &c. for a particular account of which, ſee theſe articles. See alſo MAGNETISM, LIGHTNING, THUNDER, &c. The effects of medical electricity are conſidered under the article MEDICINE. On this laſt ſubject we ſhall juſt mention the conſtruction of an inſtrument which, Mr Cavallo ſays, is very uſeful for curing the tooth-ach. It is repreſented Plate XCIX. fig. 15. and conſiſts of two wires A E, B E, fixed in two holes in the piece of baked wood H. Theſe wires, from C to D, and G to F, are bended in a plane inclined to the reſt of the wires; their extremities D E, F E, being again bended towards one another, and in the plane C A G B. The extremities A B are bended in a ring. When this inſtrument is to be uſed, it muſt be applied in ſuch a manner that the affected tooth may be pretty cloſely embraced by the two wires at E; which being flexible, may be adjuſted ſo that they will receive teeth of different ſizes: then the end A, or B, of one of the wires, muſt be connected with the outſide of a charged jar, and the end of the other wire with the knob of the jar, ſo as to make the ſhock paſs through the wires of the inſtrument, and, of conſequence, through the tooth. "A ſingle ſhock, (ſays Mr Cavallo), ſent through an affected tooth in this manner, will often cure it inſtantaneouſly; it is, however, always proper to ſend two or three ſhocks through it."

ELECTROMETER. See ELECTRICITY, n° 45.

ELECTROPHORUS. *Ibid.* n° 106.

ELECTRUM, in natural hiſtory. See AMBER.

ELECTUARY, in pharmacy, a form in which both officinal and extemporaneous medicines are frequently made. See PHARMACY, n° 883, &c.

ELEEMOSYNÆ, and ELEEMOSYNARIUS. See ALMS, and ALMONER.

ELEGANCE, or ELEGANCY, an ornament of politeneſs and agreeableneſs ſhewn in any diſcourſe, with ſuch a choice of rich and happy expreſſions, as to riſe politely above the common manners, ſo as to ſtrike people of a delicate taſte.

It is obſerved, that elegance, though irregular, is preferable to regularity without elegance: that is, by being ſo ſcrupulous of grammatical conſtruction, we loſe certain licences wherein the elegance of language conſiſts.

ELEGIAC, in ancient poetry, any thing belonging to elegy. See ELEGY.

ELEGIT, in law, a writ of execution, which lies for a perſon who has recovered debt or damages; or upon a recognizance in any court, againſt a defendant that is not able to ſatisfy the ſame in his goods.

ELEGY, a mournful and plaintive kind of poem*.

ELEMENT, a term uſed by philoſophers to denote the original component parts of bodies, or thoſe into which they are ultimately reſolvable †.

Some of the ancients repreſented the elements as corruptible, and ſome as incorruptible. Thoſe who maintained the incorruptibility of the elements, ſuppoſed them to be *atoms*, i. e. bodies which could not be divided, or broke into pieces. Of this opinion were Democritus, Epicurus, &c.

Among thoſe who held the elements to be corruptible, ſome reckoned there was but one, and ſome that there were ſeveral elements. Heraclitus held fire, Anaximenes air, Thales Mileſius water, and Heſiod earth, to be the only element. The Peripatetics contended for four elements, fire, air, earth, and water. Some of theſe philoſophers conſidered only the ſenſible properties of bodies, ſuch as pellucidity and opacity, to be elements. Of this number Ariſtotle himſelf is ſaid to have been. For, conſidering the four principal qualities that fall under the ſenſe of touch, he made four elements: the firſt, cold and dry; the ſecond, cold and moiſt; the third, hot and moiſt; and the fourth, hot and dry. To give names to theſe elements, he inquired in what things theſe qualities were found chiefly to prevail. Accordingly, taking earth to be the coldeſt,

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See *Poetry*, ° 62.

† See *Chemiſtry*, n° 10.

and at the ſame time the drieſt, of all things, he called the firſt element *earth*. Water being the coldeſt and moiſteſt of all things, he called his ſecond element *water;* and imagining air to be the hotteſt and moiſteſt of all things, he called his third element *air*. Laſtly, fire being the hotteſt and drieſt of all things, he called his fourth element *fire*.

The Carteſians admitted only of three elements, which they pretend were all that could ariſe from the firſt diviſion of matter, the whole maſs of which they ſuppoſed to have been from the beginning whirled round ſeveral different centres. The firſt element was compoſed of the angular parts and prominences broke off from the particles of matter by its continual motion. This was the *materia ſubtilis*. The ſecond element was made up of the particles from which the *materia ſubtilis* was broke off, which were now become round; and the third element conſiſted of the particles which yet remained irregular.

Succeeding philoſophers have differed greatly in their opinions; ſome adopting the Epicurean or atomical hypotheſis, and ſome the Ariſtotelian. It is, however, eaſy to ſee, that the queſtion concerning *elements* can never be ſolved. If we embrace the atomical ſyſtem, we muſt be conſcious that we know not what an *atom* is. We can have no idea of a body that doth not conſiſt of parts, and conſequently which cannot be made leſs than it is. If we adopt the notion of infinite diviſibility, or, which is much the ſame, of the Ariſtotelian *qualities*, we ſhall find ourſelves equally embarraſſed. Some have imagined that there are two diſtinct elements, which they call the *celeſtial and terreſtrial matter*. Both theſe they conſider as made up of *atoms;* but they ſuppoſe the atoms of the firſt to be active, and of the ſecond paſſive. It is difficult, however, to maintain this hypotheſis without allowing one kind of atoms to be animated. Certain it is, that we ſee one part of matter in many caſes acting upon, and giving motion to, another; but whether the matter which is *paſſive* in one caſe doth not become *active* in another, is a thing not eaſy to be determined. The utmoſt that can be ſaid upon the ſubject ſeems to be, that as long as matter is ſubject to our eye-ſight and other ſenſes, we can talk intelligibly about it; but when its parts become too ſmall to be obſerved by them, we are then totally in the dark.

Element, in a figurative ſenſe, is uſed for the principles and foundations of any art or ſcience; as Euclid's Elements, &c.

ELEMI, or Elemy, in the materia medica, a kind of reſin, very improperly called *gum elemi*. There are two ſorts of it kept in the ſhops; the one genuine, and brought from Ethiopia; the other ſpurious, and the produce of America. The true kind is a yellowiſh reſin, with a caſt of green and white; its ſmell is ſtrong and not unpleaſant, and its taſte acrid and bitter. It is very inflammable, and readily diſſolves in oil and other fat ſubſtances over the fire; which two characters alone ſufficiently diſtinguiſh it from the gums: but this genuine elemi is very rare in Europe.

The ſpurious elemi is a whitiſh reſin produced from a tall tree, with pinnated leaves, not unlike thoſe of the pear-tree. It is in ſome degree pellucid, and of a fragrant ſmell. It is only uſed externally, being greatly recommended for reſolving tumours, deterging ulcers, wounds, &c. though Dr Lewis is of opinion, its internal uſe might be advantageous in many caſes.

ELEPHANT, in zoology. See Elephas.

American Elephant: An animal only known in a foſſile ſtate, and that but partially, from the teeth, ſome of the jaw-bones, the thigh-bones, and vertebræ, found with many others five or ſix feet beneath the ſurface on the banks of the Ohio. But theſe bones differ in ſeveral reſpects from thoſe of the elephant; for which, ſee *Foſſil* Bones. As yet the living animal has evaded our ſearch. Mr Pennant thinks it "more than probable, that it ſtill exiſts in ſome of thoſe remote parts of the vaſt new continent unpenetrated yet by Europeans. Providence maintains and continues every created ſpecies; and we have as much aſſurance that no race of animals will any more ceaſe while the earth remaineth, than *ſeed-time and harveſt, cold and heat, ſummer and winter, day or night*."

Elephant-*Beetle*. See Scarabæus.

Knights of the Elephant, an order of knighthood in Denmark, conferred upon none but perſons of the firſt quality and merit. It is alſo called the *order of St Mary*. Its inſtitution is ſaid to have been owing to a gentleman among the Daniſh croiſes having killed an elephant, in an expedition againſt the Saracens, in 1184; in memory of which, king Canutus inſtituted this order, the badge of which is a towered elephant, with an image of the holy virgin encircled with rays, and hung on a watered ſky-coloured ribbon, like the George in England.

ELEPHANTA, a ſmall, but very remarkable iſland about five miles from the caſtle of Bombay in the Eaſt Indies. Of this we have the following deſcription from Mr Groſſe's voyage to the Eaſt Indies. "It can at moſt be but about three miles in compaſs, and conſiſts of almoſt all hill: at the foot of which, as you land, you ſee, juſt above the ſhore, on your right, an elephant, coarſely cut out in ſtone, of the natural bigneſs, and at ſome little diſtance not impoſſible to be taken for a real elephant, from the ſtone being naturally of the colour of that beaſt. It ſtands on a platform of ſtones of the ſame colour. On the back of this elephant was placed, ſtanding, another young one, appearing to have been all of the ſame ſtone, but has been long broken down. Of the meaning, or hiſtory, of this image, there is no tradition old enough to give any account.

"Returning then to the foot of the hill, you aſcend an eaſy ſlant, which about half way up the hill brings you to the opening or portal of a large cavern hewn out of a ſolid rock, into a magnificent temple: for ſuch ſurely it may be termed, conſidering the immenſe workmanſhip of ſuch an excavation; and ſeems to me a far more bold attempt, than that of the pyramids of Egypt. There is a fair entrance into this ſubterraneous temple, which is an oblong ſquare, in length about 80 or 90 feet, by 40 broad. The roof is nothing but the rock cut flat at top, and in which I could not diſcern any thing that did not ſhow it to be all of one piece. It is about 10 feet high, and ſupported towards the middle, at equi-diſtance from the ſides and from one another, with two regular rows of pillars of a ſingular order. They are very maſſive, ſhort in proportion to their thickneſs, and their capital bears ſome reſemblance to a round cuſhion preſſed by the ſuperincumbent mountain, with which they are alſo of one piece. At the further end of this temple are three gigantic figures; the face of one of them is at leaſt five feet in length, and of a proportionable breadth. But theſe repreſentations have no reference or connection, either to any known hiſtory, or the mythology of the Gentoos. They had continued in a tolerable ſtate of preſervation and wholeneſs, conſidering the remoteneſs of their antiquity, until the arrival of the Portugueſe, who made themſelves maſters of the place; and in the blind fury of their bigotry, not ſuffering any idols but their own, they muſt have even been at ſome pains to maim and deface them, as they now remain, conſidering the hardneſs of the ſtone. It is ſaid they even brought field-pieces to the demolition of images, which ſo greatly deſerved to be ſpared for the unequalled curioſity of them. Of this Queen Catherine of Portugal was, it ſeems, ſo ſenſible, that ſhe could not conceive that any traveller would return from that ſide of India, without viſiting the wonders of this cavern; of which too the ſight appeared to me to exceed all the deſcriptions I had heard of them. About two thirds of the way up this temple, on each ſide, and fronting each other, are two doors or outlets into ſmaller grots or excavations, and freely open to the air. Near and about the door-way, on the right-hand, are ſeveral mutilated images, ſingle and in groupes. In one of the laſt, I remarked a kind of reſemblance to the ſtory of Solomon dividing the child, there ſtanding a figure with a drawn ſword, holding in one hand an infant with the head downwards, which it appears in act to cleave through the middle. The outlet of the other on the left hand, is into an area of about 20 feet in length, and 12 in breadth; at the upper end of which, as you turn to the right, preſents itſelf a colonade covered at top, of 10 or 12 feet deep, and in length anſwering to the breadth of the area: this joins to an apartment of the moſt regular architecture, an oblong ſquare, with a door in perfect ſymmetry; and the whole executed in quite a contrary taſte and manner from any of the oldeſt or beſt Gentoo buildings any where extant. I took particular notice of ſome paintings round the cornices, not for any thing curious in the deſign, but for the beauty and freſhneſs of the colouring, which muſt have laſted ſome thouſands of years, on ſuppoſing it, as there is all reaſon to ſuppoſe it, cotemporary with the building itſelf. The floor of the apartment is generally full of water, its pavement or ground-work not permitting it to be drawn off, or to be ſoaked up. For it is to be obſerved, that even the cavern itſelf is not viſitable after the rains, until the ground of it has had time to dry into a competent hardneſs."

ELEPHANTIASIS, called alſo the *lepra of the Arabians*, in medicine, a chronical diſeaſe, one of the two ſpecies of leproſy, which affects the whole body, where even the bones as well as the ſkin are covered with ſpots and tumours, which being red, at laſt turn black. See (the *Index* ſubjoined to) MEDICINE.

ELEPHANTINE, in Roman antiquity, an appellation given to the books wherein were regiſtered the tranſactions of the ſenate and magiſtrates of Rome, of the emperors or generals of armies, and even of the provincial magiſtrates; the births and claſſes of the people, and other things relating to the cenſus.

They are ſuppoſed to have been ſo called, as being made of ivory; though ſome will have them to have been written on the inteſtines of elephants.

ELEPHANTOMACHI. See ETHIOPIA.

ELEPHAS, or the ELEPHANT, in zoology, a genus of quadrupeds belonging to the order of bruta. The characters are theſe: The elephant has no fore-teeth in either jaw, and the dog-teeth are very long: the proboſcis, or trunk, is long, and capable of laying hold of any thing; and the body is ſomewhat naked.

The elephant is the largeſt of all land-animals. From the front to the origin of the tail he is generally about 16 feet long, from the end of the trunk 25 feet, and about 14 feet high. The circumference of the neck is 17 feet, and the circumference of the body at the groſſeſt part 25 feet 10 inches; the tail is about 6 feet long, and 2½ in circumference. The circumference of the legs is about 6 feet. The eyes are ſmall in proportion to the ſize of the animal. The muzzle is very different from that of any other quadruped; it is nothing but the origin of a long trunk which hangs between the two large tuſks; the mouth appears behind the trunk, which ſerves in place of an upper lip, and the under lip terminates in a point. The tail is ſhort, and ſmall in compariſon of the trunk, which has the appearance of a long thick tail placed before. The feet are ſhort, round, clumſy, and only diſtinguiſhable by the toes. The trunk is, properly ſpeaking, the noſe extended, and terminated by a couple of noſtrils. But, beſides ſerving as an organ of ſmell, the trunk performs all the functions of a ſtrong and dexterous arm. The trunk of an elephant is about 8 feet long, 5½ feet in circumference near the mouth, and one foot and a half near the extremity: it is a pipe of an irregular conical figure, and widened at the end: the ſuperior ſide of the trunk is convex, and furrowed tranſverſely; and the inferior ſide is flat, and has two longitudinal rows of ſmall protuberances reſembling the tentacula of the ſilk-worm and moſt other caterpillars. The upper part of the trunk correſponds with the extremity of the noſe in other quadrupeds, and anſwers the ſame intention; the inferior part ſerves as an upper lip, including the noſtrils at the ſame time. For the trunk is a continued canal, divided into two cavities by a longitudinal partition: theſe cavities aſcend along the forepart of the upper jaw, where they make a turn inward, and deſcend into the palate, and then terminate in two ſeparate orifices; they have likewiſe each a ſeparate orifice at the end of the trunk. At the place where theſe cavities make a turn, and before they enter into the bones of the head, there is a moveable cartilaginous plate ſituate in ſuch a manner as enables the animal to ſhut the canal, and to prevent the water, with which it occaſionally fills the trunk, from entering into the paſſage of the noſe where the organs ſerving for the ſenſation of ſmell are placed. The elephant can move the trunk in all directions; he can extend or ſhorten it at pleaſure, without altering the diameters of the two canals within. By this means reſpiration is not interrupted, whatever be the ſituation of the trunk; and the water is allowed to remain till the animal chuſes to throw it out by an exſpiration. Each canal is lined with a ſmooth ſtrong membrane, and the ſurface of the trunk is covered with another ſtrong membrane or ſkin. The ſubſtance contained between the exterior and interior membranes, is a compoſition of longitudinal and tranſverſe muſcles, which ſerve to extend and contract the length of the trunk. At the extremity of the trunk there is a concave protuberance, in the bottom of which are the two paſſages of the noſtrils. The inferior part of the protuberance is thicker than the ſides, and the ſuperior part is ſtretched out like a finger about five inches long; which, together with the edges of the whole extremity of the trunk, takes on different figures according to the neceſſities of the animal. It is by this organ that the animal lays hold of food, or other ſubſtances; which he manages with as much dexterity as a man does his hand, taking up grains of corn, or the ſmalleſt piles of graſs, and conveying them to his mouth. When he drinks, he thruſts his trunk into the water, and fills it by drawing in his breath, and exhauſting the air: when the trunk is thus filled with water, he can either throw it out to a great diſtance, or drink it by putting the end of the trunk in his mouth.

The two large tuſks, which ſome call the *horns* of the elephant, are of a yellowiſh colour, and extremely hard. The bony ſubſtance of which they are compoſed is known by the name of IVORY, and much uſed in different branches of manufacture.

The ears are very large, and reſemble thoſe of an ape. The ſkin of the elephant has but few hairs on it, and placed at great diſtances from each other. It is full of wrinkles, like thoſe on the palm of a man's hand, beſides many chaped and greaſy ridges. The female has two dugs, one on each ſide of the breaſt. The parts of generation are ſmall in proportion to thoſe of other animals. The penis reſembles that of a horſe. The female organ is ſituated near the middle of the belly, more than two feet diſtant from the uſual ſituation in other quadrupeds: when they copulate, the female lies down on her back.

Elephants, even in a ſavage ſtate, are peaceable and gentle creatures. They never uſe their weapons but in defence of themſelves or companions. Their ſocial diſpoſitions are ſo ſtrong, that they are ſeldom found alone, but march always in large troops: the oldeſt and moſt experienced lead the van; the younger, or lame ones, keep in the middle; and thoſe of a ſecond rate, as to age, walk in the rear. The females carry their young on their tuſks, embracing them at the ſame time with their trunk. They ſeldom march in this regular order but when they reckon the journey dangerous, ſuch as an expedition to cultivated lands, where they expect to meet with reſiſtance. On other occaſions they are leſs cautious; ſome of them falling behind or ſeparating from the reſt, but ſeldom ſo far as to be without the reach of aſſiſtance by alarming and aſſembling their companions. It is only theſe wanderers that the hunters dare attack: for it would require a whole army to aſſail a troop of them; and even an army would be unable to conquer them without loſing a number of lives. It is dangerous to offer them the leaſt injury: for they run ſtraight upon the offender; and, although the weight of their body be great, their ſteps are ſo large, that they eaſily outrun the ſwifteſt man, whom they either pierce with their tuſks, or ſeize with their trunk, dart him in the air like a ſtone, and then trample him under their feet. But they never attack any perſon, unleſs when provoked. However, as they are extremely ſenſible and delicate with regard to injuries, it is always prudent to keep out of their way. Travellers who frequent theſe countries kindle large fires, and beat drums during the night, in order to prevent their approach. After being once attacked by men, or falling into any ambuſh, they are ſaid never to forget the injury, but ſearch for every opportunity of getting revenge. As they are endowed perhaps with a more exquiſite ſenſation of ſmell than any other animal, owing to the great extent of their noſe, they can ſcent a man at a very great diſtance, and trace him by his footſteps.

Elephants are peculiarly fond of the banks of rivers, deep valleys, and marſhy grounds, eſpecially when well ſhaded with trees. They delight in drawing up water into their trunks, even when they do not drink it, and amuſe themſelves in daſhing the water around. They cannot endure cold, and are equally averſe to an exceſs of heat: in order to avoid the ſcorching heat of the ſun, they retire to the thickeſt and moſt ſhady parts of the foreſt. The bulk of their bodies is ſo enormous, that they do not chuſe to go into deep waters ſo frequently as ſome other quadrupeds; although the length of their trunk, which they raiſe ſtraight up, and by which they reſpire, is a great advantage in ſwimming.

The ordinary food of elephants is roots, herbs, leaves, the tender branches of trees, fruits, and grains: but they abhor fleſh or fiſh. When any of them diſcovers a fine paſture, he immediately calls and invites his companions to come and eat with him. As they devour a large quantity of food in a ſhort time, they are always ſhifting their paſture; when they meet with cultivated grounds, they make a prodigious deſolation, and deſtroy more plants by their feet than they uſe for nouriſhment; which laſt is very conſiderable, amounting to 150 pounds of herbage every day: by this means, as they conſtantly graze in large troops, they lay waſte whole fields in an hour. The Indians and negroes employ every art to prevent them from viſiting their cultivated lands, making great noiſes, and burning large fires round their fields. However, theſe precautions are not always ſufficient to prevent the elephants from viſiting them. They chaſe away the domeſtic animals, put the men to flight, and ſometimes even throw down their limber huts. Elephants are hardly ſuſceptible of fear; the only things which can ſurpriſe them, or ſtop their courſe, are artificial fires, ſuch as ſquibs, crackers, &c. the effects of which are ſo ſudden and ſo quickly repeated, that the elephants frequently turn back; and when one runs, all the reſt inſtantly follow his example.

Although the ſocial diſpoſition in the elephant be exceeding ſtrong; yet whenever the females come in ſeaſon, it immediately gives place to the ſtronger and more intereſting paſſion of love. They obſerve the greateſt delicacy in their amours, abhorring nothing ſo much as to be ſeen by their companions. The troop divide themſelves into couples, ſteal off into the moſt ſecret places of the foreſt, and then give way to all the impulſes of nature, which are lively and laſting in proportion to the long period of abſtinence; for the female goes with young two years, and it is only once in three years that the ſeaſon of love returns. They bring forth but one at a time; which, as ſoon as it comes into the world, is as large as a wild boar, and is furniſhed with teeth; however, the large tuſks do not make their appearance till ſome time after, and at the age of ſix months they are ſeveral inches long. Elephants of this age are as large as an ox, when in a natural ſtate. But it is incredible how they degenerate when inſlaved and under the management of men. Their diſguſt and chagrin for the loſs of liberty ſeems never to depart from their minds. In this ſtate, though they feel, at the proper ſeaſons, the ſtrongeſt deſires for the ſex, no art can allure them to copulate: but the natural paſſion, reſtrained by an exceſs of modeſty, burſts out into ſuch violent fits of fury and reſentment, that the ſtrongeſt chains are hardly ſufficient to command them. This is a ſtriking difference betwixt the elephant and moſt other tamed animals. It is only the individual that we can enſlave; the ſpecies, in ſpite of all our endeavours, ſtill retain their original freedom and independence.

The manner of taking and taming elephants, therefore, merits our attention. In foreſts and ſuch places as are frequented by elephants, the Indians chooſe a ſpot and incloſe it with ſtrong palliſades; they uſe the largeſt trees as the principal ſtakes, to which are fixed ſmaller ones in a tranſverſe direction. Theſe croſs-trees are fixed ſo as to allow a man to paſs eaſily through. There is likewiſe a large port left for the elephant, over which is ſuſpended a ſtrong barrier, which is let down as ſoon as he enters. In order to decoy him into the incloſure, the hunters take along with them a tame female in ſeaſon, and travel about till they come ſo near as that the cry of the female can reach a male, whom they previouſly obſerve in the foreſt; then the guide of the female makes her give the cry peculiar to the ſeaſon of love: the male inſtantly replies, and ſets out in queſt of her. The guide then makes the female proceed towards the artificial incloſure, repeating her cries from time to time as ſhe goes along. She enters into the incloſure, the male follows her, and the Indians immediately ſhut the port behind him. He no ſooner diſcovers the hunters, and that he is incloſed, than his paſſion for the ſex is converted into rage and fury. The hunters entangle him with ſtrong ropes; they fetter his legs and trunk; they bring two or three tame elephants in order to pacify and reconcile him to his condition. In a word, they reduce him to obedience in a few days, by a proper application of torture and careſſes. There are many other methods of catching elephants. Inſtead of making large incloſures with palliſades, like the kings of Siam, and other monarchs, the poor Indians content themſelves with a very ſimple apparatus: they dig deep pits in the roads frequented by elephants, covering them over with branches of trees, turf, &c. When an elephant falls into one of theſe pits, he is unable to get out again.

The elephant, when tamed, is the moſt friendly and obedient of all animals: he is entirely attached to the perſon who feeds and takes care of him. In a ſhort time he underſtands ſigns, and the ſound of his maſter's voice. He diſtinguiſhes the language of paſſion, of command, of ſatisfaction; and acts accordingly. He receives his orders with attention, and executes them with prudence and alacrity, but without precipitation. He eaſily learns to bow his knees and lower his body, for the convenience of thoſe who mount him. He careſſes his friends with his trunk. He lifts burdens with his trunk, and aſſiſts thoſe who are loading him in laying them on his back. He delights in ſhining harneſs and trappings. When yoked in a cart or waggon, he pulls equally and cheerfully, unleſs he be abuſed by injudicious chaſtiſements. His guide is generally mounted on his neck, with a ſmall rod of iron ſharp at the point in his hand; he directs his motion by pricking him on the ears and head; but, for the moſt part, a word is ſufficient.

A tame elephant will do more labour than ſix horſes: but then he requires a proportional quantity of food. They are the principal beaſts of burden in many parts of Africa and the Eaſt Indies. They carry ſacks and bundles of all kinds on their neck, back, and tuſks. They never loſe or damage any thing committed to their care: they will ſtand on the edge of a river, take bundles off their necks and tuſks, lay them carefully in a boat wherever they are deſired, and try with their trunk whether they are properly ſituated; if they be loaded with caſks, they go in queſt of ſtones to prop them and prevent them from rolling.

Ludolph. Com. in hiſt. Æthiop. p. 147.

The elephant is not only the moſt tractable, but the moſt intelligent, of animals; ſenſible of benefits, reſentful of injuries, and endowed even with a ſenſe of glory.—In India, they were once employed in the launching of ſhips: one was directed to force a very large veſſel into the water; the work proved ſuperior to his ſtrength: his maſter, with a ſarcaſtic tone, bid the keeper take away this lazy beaſt and bring another: the poor animal inſtantly repeated his efforts, fractured his ſkull, and died on the ſpot. In Delli, an elephant paſſing along the ſtreets, put his trunk into a taylor's ſhop, where ſeveral people were at work: one of them pricked the end with his needle: the beaſt paſſed on; but in the next dirty puddle filled his trunk with water, returned to the ſhop, and ſpurting every drop among the people who had offended him, ſpoilt their work.

Ibid.

An elephant in Adſmeer, which often paſſed thro' the bazar or market, as he went by a certain herbwoman, always received from her a mouthful of greens: at length he was ſeized with one of his periodical fits of rage, broke his fetters, and, running through the market, put the crowd to flight; among others, this woman, who in haſte forgot a little child ſhe had brought with her. The animal recollecting the ſpot where his benefactreſs was wont to ſit, took up the infant gently in his trunk, and placed it in ſafety on a ſtall before a neighbouring houſe. Another, in his madneſs, killed his *cornac* or governor: the wife ſeeing the miſfortune, took her two children and flung them before the elephant, ſaying, "Now you have deſtroyed their father, you may as well put an end to their lives and mine." It inſtantly ſtopped, relented, took the greateſt of the children, placed him on its neck, adopted him for its *cornac*, and never afterwards would permit any body elſe to mount it.

Voyage de la Caille, p. 160.

At the Cape of Good-Hope, it is cuſtomary to kill thoſe animals, for the ſake of their teeth, by the chace. Three horſemen, well-mounted and armed with lances, attack the elephant alternately, each relieving the other as they ſee their companion preſſed, till the beaſt is ſubdued. Three Dutchmen (brothers), who had made large fortunes by this buſineſs, determined to retire to Europe, and enjoy the fruits of their labours; but reſolved, before they went, to have a laſt chace by way of amuſement: they met with their game, and began the attack in the uſual manner; but unfortunately one of their horſes fell down and flung its rider: the enraged animal inſtantly ſeized the unhappy man with its trunk, flung him up to a vaſt height in the air, and received him on one of its tuſks; then turning towards the two other brethren, as if it were with an aſpect of revenge and inſult, held out to them the impaled wretch wreathing on the bloody tooth.

From the earlieſt accounts in hiſtory, the eaſtern nations have employed elephants in war; Alexander the Great was the firſt European who ever mounted an elephant. He carried a number of them into Greece, which Pyrrhus employed ſome years after againſt the Romans at the battle of Tarentum. Both the Greeks and Romans ſoon learnt to get the better of theſe monſtrous animals: they opened their ranks and allowed them to paſs through; neither did they attempt to hurt them, but threw darts, &c. at their guides. Now that fire-arms are the principal inſtruments of war, elephants, who are terrified at the noiſe and flame, inſtead of being uſeful, would only tend to embarraſs and confuſe an army. However, in Cochin and other parts of Malabar, as alſo in Tonquin, Siam, and Pegu, where fire-arms are little underſtood, they are ſtill uſed in battle. The guide ſits aſtride upon the neck, and the combatants ſit or ſtand upon the other parts of the body.

When the elephant is properly managed, he lives very long even in a ſtate of ſlavery and labour. That ſome have lived in this ſtate 130 years, is pretty well authenticated. In a natural ſtate, they often exceed 200 years, and propagate their ſpecies till they are 120: It is 30 years before they come to their full growth.

The elephant inhabits India, and ſome of its greater iſlands, Cochin China, and ſome of the provinces of China. It abounds in the ſouthern parts of Africa, from the river Senegal to the Cape; and from thence as high as Ethiopia on the other ſide. They are found in the greateſt numbers in the interior parts, where there are vaſt foreſts, near the ſides of rivers. They are not at preſent domeſticated in Africa, but only in the more civilized parts of Aſia. They are much more numerous in Africa. In ſome parts they ſwarm ſo, that the Negroes are obliged to make their habitations under ground for fear of them. They are killed and eaten by the natives, and the trunk is ſaid to be a delicious morſel. All the teeth are brought from Africa: they are frequently picked up in the woods; ſo that it is uncertain whether they are ſhed teeth, or thoſe of dead animals. The African teeth which come from Moſambique, are 10 feet long; thoſe of Malabar only three or four; the largeſt in Aſia are thoſe of Cochin China, which even exceed the ſize of the elephants of Moſambique. The ſkin is thick, and, when dreſſed, proof againſt a muſket ball. The fleſh, the gall, the ſkin, and the bones, are ſaid to be uſed medicinally by the Chineſe.

ELEVATION, the ſame with ALTITUDE or height.

ELEVATION *of the Hoſt*, in the church of Rome, that part of the maſs where the prieſt raiſes the hoſt above his head for the people to adore.

ELEVATOR, in anatomy, the name of ſeveral muſcles, ſo called from their ſerving to raiſe the parts of the body to which they belong.

ELEVATORY, in ſurgery, an inſtrument for raiſing depreſſed or fractured parts of the ſcull, to be applied after the integuments and perioſteum are removed. See SURGERY.

ELEVENTH, or chord of the eleventh. See INTERVAL.

ELEUSINIA, in Grecian antiquity, a feſtival kept in honour of Ceres, every fourth year by ſome ſtates, but by others every fifth. The Athenians celebrated it at Eleuſis, a town of Attica; whence the name.

It was celebrated with a world of ceremony, and perſons of both ſexes were initiated in it; it being deemed impious to neglect doing ſo. The myſteries were of two ſorts; the leſſer, and the greater: whereof the former were ſacred to Proſerpine, Ceres's daughter; and the latter to Ceres herſelf. According to Lactantius, they conſiſted in a myſtical repreſentation of what mythologiſts teach of Ceres; tho' ſome of the Chriſtian fathers will have the great myſtery, or ſecret, which they were forbidden by law, upon pain of death, to divulge, to have been the repreſentation or figures of both male and female privities, which were handed about and expoſed to the company.

ELEUTHERIA, another feſtival celebrated at Platæa, by delegates from almoſt all the cities of Greece, in honour of Jupiter Eleutherius, or the aſſertor of liberty.

It was inſtituted in memory of the victory obtained by the Grecians, in the territories of Platæa, over Mardonius, the Perſian general left by Xerxes with a mighty army to ſubdue Greece.

ELF, a term now almoſt obſolete, formerly uſed to denote a fairy, or hobgoblin; an imaginary being, the creature of ignorance, ſuperſtition, and craft *.

ELF-*Arrows*, in natural hiſtory, a name given to the flints, anciently faſhioned into arrow-heads, and ſtill found foſſile in Scotland, America, and ſeveral other parts of the world: they are believed by the vulgar to be ſhot by fairies, and that cattle are ſometimes killed by them.

ELGIN, the capital of the county of Murray in Scotland, ſituated on the river Loſey about ſix miles north from the Spey, in W. Long. 2. 25. N. Lat. 57. 40. Mr Pennant ſays, it is a good town, and hath many of the houſes built over piazzas; but, excepting its great cattle-fairs, has little trade. It is principally remarkable for its eccleſiaſtical antiquities. The cathedral, now in ruins, has been formerly a very magnificent pile. The weſt door is very elegant and richly ornamented. The choir is very beautiful, and has a fine and light gallery running round it; and at the eaſt end are two rows of narrow windows in an excellent Gothic taſte. The chapter-houſe is an octagon; the roof ſupported by a fine ſingle column with neat carvings of coats of arms round the capital. There is ſtill a great tower on each ſide of this cathedral; but that in the centre, with the ſpire and whole roof, are fallen in; and form moſt awful fragments, mixed with the battered monuments of knights and prelates. Boethius ſays, that Duncan, who was killed by Macbeth at Inverneſs, lies buried here. The place is alſo crowded with a number of modern tomb-ſtones.—— The cathedral was founded by Andrew de Moray, in 1224, on a piece of land granted by Alexander II.; and his remains were depoſited in the choir, under a tomb

* See Fairy.

tomb of blue marble, in 1244. The great tower was built principally by John Innes biſhop of this ſee, as appears by the inſcription cut on one of the great pillars: "Hic Jacet in Xto, pater et dominus, Dominus *Johannes de Innes*, hujus eccleſiæ Epiſcopus;—qui hoc notabile opus incepit et per ſeptennium edificavit."

ELIAS, the prophet, memorable for having eſcaped the common cataſtrophe of mankind; being taken up alive into heaven, in a fiery chariot, about 895 B. C. See *the Bible*.

ELICHMAN (John), a native of Sileſia in the 17th century, who practiſed phyſic at Leyden, and was remarkable for underſtanding 16 longuages. He ſupported an opinion, that the German and Perſian languages were derived from the ſame origin. His Latin tranſlation of the *Tablet of Cebes*, with the Arabic verſion and the Greek, was printed at Leyden in 1640, under the care of Salmaſius, who prefixed thereto a very ample preface.

ELIQUATION, in chemiſtry, an operation by which a more fuſible ſubſtance is ſeparated from one that is leſs ſo, by means of a heat ſufficiently intenſe to melt the former, but not the latter. Thus an allay of copper and lead may be ſeparated by a heat capable of melting the latter, but not the former.

ELISHA the prophet, famous for the miracles he performed, died about 830 B. C. See *the Bible*.

ELISION, in grammar, the cutting off or ſuppreſſing a vowel at the end of a word, for the ſake of ſound, or meaſure, the next word beginning with a vowel.

Eliſions are pretty frequently met with in Engliſh poetry, but more frequently in the Latin, French, *&c.* They chiefly conſiſt in ſuppreſſions of the *a*, *e*, and *i*, though an eliſion ſuppreſſes any of the other vowels.

ELIXATION, in pharmacy, the extracting the virtues of ingredients by boiling or ſtewing.

ELIXIR, in medicine, a compound tincture extracted from many efficacious ingredients. Hence the difference between a tincture and an elixir ſeems to be this, that a tincture is drawn from one ingredient, ſometimes with an addition of another to open it and to diſpoſe it to yield to the menſtruum; whereas an elixir is a tincture extracted from ſeveral ingredients at the ſame time. See PHARMACY, nº 388, *&c.*

ELIZABETH, queen of England, daughter of Henry VIII. and Anna Boleyn, was born at Greenwich, September 7th, 1533. According to the humour of the times, ſhe was early inſtructed in the learned languages, firſt by Grindal, who died when ſhe was about 17, and afterwards by the celebrated Roger Aſcham. She acquired likewiſe conſiderable knowledge of the Italian, Spaniſh, and French languages. Dr Grindal was alſo her preceptor in divinity, which ſhe is ſaid to have ſtudied with uncommon application and induſtry. That Elizabeth became a Proteſtant, and her ſiſter Mary a Papiſt, was the effect of that cauſe which determines the religion of all mankind; namely, the opinion of thoſe by whom they were educated: and this difference of opinion, in their tutors, is not at all ſurpriſing, when we recollect, that their father Harry was of both religions, or of neither.

But the ſtudies of our illuſtrious princeſs were not confined merely to languages and theology: ſhe was alſo inſtructed in the political hiſtory of the ancients; and was ſo well ſkilled in muſic, as to ſing and play "artfully and ſweetly."

After the ſhort reign of her brother Edward, our heroine being then about 20 years of age, her ſiſter *firebrand* acceding to the crown, Elizabeth experienced a conſiderable degree of perſecution, ſo as to be not a little apprehenſive of a violent death. She was accuſed of nobody knows what; impriſoned; and, we are told, inhumanly treated. At laſt, by the interceſſion of king Philip of Spain, ſhe was ſet at liberty; which ſhe continued to enjoy, till, on the death of her *pious* ſiſter, ſhe, on the 17th of November 1558, aſcended the throne of England. Her political hiſtory, as a queen, is univerſally known, and admired *: but her attention to the government of her kingdom did not totally ſuſpend her purſuit of learning. Aſcham, in his *School-maſter*, tells us, that, about the year 1563, five years after her acceſſion, ſhe being then at Windſor; beſides her perfect readineſs in Latin, Italian, French, and Spaniſh, ſhe read more Greek in one day, than ſome prebendaries of that church did read Latin in a whole week, (p. 21.)—She employed Sir John Forteſcue to read to her, Thucydides, Xenophon, Polybius, Euripides, Æſchines, and Sophocles. (*Ballard*, p. 219.)—That the Latin language was familiar to her, is evident from her ſpeech to the univerſity of Oxford, when ſhe was near ſixty; alſo from her ſpirited anſwer to the Poliſh ambaſſador in the year 1598. And that ſhe was alſo ſkilled in the art of poetry appears, not only from the ſeveral ſcraps which have been preſerved, but likewiſe from the teſtimony of a cotemporary writer, Puttenham, in his *Art of Engl. Poetry* (a very ſcarce book). Theſe are his words:—"But, laſt in recital, and firſt in degree, is the queen, whoſe learned, delicate, noble muſe, eaſily ſurmounteth all the reſt, for ſenſe, ſweetneſs, or ſubtilty, be it in ode, elegy, epigram, or any other kind of poem," &c. In this author are to be found only a ſpecimen of 16 verſes of her Engliſh poetry. "But," ſays Mr Walpole, "a greater inſtance of her genius, and that too in Latin, was her extempore reply to an inſolent prohibition delivered to her from Philip II. by his embaſſador, in this tetraſtic.

> Te veto ne pergas bello defendere Belgas:
> Quæ Dracus eripuit, nunc reſtituantur oportet:
> Quas pater evertit, jubeo te condere cellas:
> Religio papæ fac reſtituatur ad unguem.

"She inſtantly anſwered him, with as much ſpirit as ſhe uſed to return his invaſions,"

> Ad Græcas, bone rex, fient mandata calendas.

Being earneſtly preſſed by a Romiſh prieſt, during his perſecution, to declare her opinion concerning the real preſence of Chriſt's body in the wafer, ſhe anſwered,

> Chriſt was the word that ſpake it;
> He took the bread, and brake it;
> And what that word did make it,
> That I believe, and take it.

Fuller's Holy State.

She gave the characters of four knights of Nottinghamſhire in the following diſtich:

> Gervaſe the gentle, Stanhope the ſtout,
> Markham the lion, and Sutton the lout.

Walp. Cat.

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* See (Hiſtory of) *England*.

Coming into a grammar-ſchool, ſhe characteriſed three claſſic authors in this hexameter :

> Perſius a crab-ſtaff; bawdy Martial ; Ovid a fine wag.
>
> *Full. Worth. of Warw.* 126.

Sir Walter Raleigh having wrote on a window,

> Fain would I climb, yet fear I to fall;

She immediately wrote under it,

> If thy heart fail thee, climb not at all.
>
> *Worth. of Devonſh.* 261.

Doubtleſs, ſhe was a woman of ſingular capacity, and extraordinary acquirements ; and, if we could forget the ſtory of the Scottiſh Mary, and of her favourite Eſſex, together with the burning a few Anabaptiſts, we might pronounce her the moſt illuſtrious of illuſtrious women. She died in her palace at Richmond, the 24th of March, 1602, aged 70, having reigned 44 years ; and was interred in the chapel of Henry VII. in Weſtminſter abbey. Her ſucceſſor James erected a magnificent monument to her memory. —She wrote, 1. *The mirrour, or glaſs of the ſinful ſoul.* This was tranſlated out of French verſe into Engliſh proſe, when ſhe was eleven years old. It was dedicated to queen Catharine Parr. Probably it was never printed ; but the dedication and preface are preſerved in the *Sylloge epiſtolarum*, in Hearne's edition of *Livii Foro-Julienſis*, p. 161. 2. *Prayers and meditations*, &c. Dedicated to her father, dated at Hatfield, 1545. Manuſcript, in the royal library. 3. *A dialogue out of Xenophon, in Greek, between Hiero a king, yet ſome time a private perſon, and Simonides a poet, as touching the life of the prince and private man.* Firſt printed, from a manſcript in her majeſty's own hand-writing, in the Gentleman's Magazine for 1743. 4. Two orations of Iſocrates, tranſlated into Latin. 5. Latin oration at Cambridge. Preſerved in the king's library : alſo in Hollinſhed's Chron. p. 1206 ; and in Fuller's Hiſt. of Cambr. p. 138. 6. Latin oration at Oxford. See Wood's Hiſt. and Antiq. of Oxf. lib. i. p. 289. alſo in Dr Jebb's Append. to his Life of Mary, Queen of Scots. 7. A comment on Plato. 8. *Boethius de conſolatione philoſophiæ*, tranſlated into Engliſh anno 1593. 9. *Salluſt de bello Jugurthino*, tranſlated into Engliſh anno 1590. 10. A play of Euripides tranſlated into Latin, *Cat. of Royal Auth.* 11. A prayer for the uſe of her fleet in the great expedition in 1596. 12. Part of Horace's art of poetry, tranſlated into Engliſh, anno 1598. 13. *Plutarch de curioſitate*, tranſlated into Engliſh. 15. Letters on various occaſions to different perſons; ſeveral ſpeeches to her parliament ; and a number of other pieces.

Elizabeth Petrowna, (daughter of Peter the Great), the laſt empreſs of Ruſſia, diſtinguiſhed herſelf by her ſignal clemency. She made a vow, that no perſon ſhould be put to death in her reign, and ſhe ſtrictly obſerved it. The example has been followed, and confirmed by law, under the preſent auguſt ſovereign of Ruſſia, Catharine II. Elizabeth died in 1762, in the 21ſt year of her reign and 52d of her age.

ELK, in zoology. See Cervus.

ELL, a meaſure of length, different in different countries : but thoſe moſtly uſed, are the Engliſh and Flemiſh ells ; whereof the former is three feet nine inches, or one yard and a quarter ; and the latter only 27 inches, or three quarters of a yard. In Scotland, the ells contains $37\frac{2}{10}$ Engliſh inches.

ELLIPSIS, in geometry, a curve line returning into itſelf, and produced from the ſection of a cone by a plane cutting both its ſides, but not parallel to the baſe. See Conic *Sections.*

Ellipsis, in grammar, a figure of ſyntax, wherein one or more words are not expreſſed ; and from this deficiency, it has got the name *ellipſis*.

ELLIPTIC, or Elliptical, ſomething belonging to an ellipſis.

ELLIPOMACHROSTYLA, in natural hiſtory, a genus of imperfect cryſtals, with ſingle pyramids ; one end of their column being affixed to ſome ſolid body. They are dodecahedral, with thinner hexangular columns and hexangular pyramids.

Of theſe cryſtals, authors enumerate a great many ſpecies ; among which are the whitiſh pellucid ſprig cryſtal, a bright brown kind, a dull brown kind, and a bright yellow kind, all which are farther diſtinguiſhed according to the different lengths of their pyramids.

ELLIPOPACHYSTYLA, in natural hiſtory, a genus of imperfect cryſtals, compoſed of 12 planes, in an hexangular column, terminated by an hexangular pyramid at one end, and irregularly affixed to ſome other body at the other, with ſhorter columns.

There are two ſpecies of theſe cryſtals ; one ſhort, bright, and colourleſs, found in great plenty in New Spain and other parts of America ; the other, a ſhort, dull, and duſky brown one, found in Germany, and ſometimes in England.

ELM, in botany. See Ulmus.

ELMACINUS (George), author of a *Hiſtory of the Saracens*, was born in Egypt towards the middle of the 13th century. His hiſtory comes down from Mahomet to the year of the Hegira 512, anſwering to the year of our Lord 1134 ; in which he ſets down year by year, in a very conciſe manner, whatever regards the Saracen empire, intermixed with ſome paſſages relating to the eaſtern Chriſtians. His abilities muſt have been conſiderable ; ſince, though he profeſſed Chriſtianity, he held an office of truſt near the perſons of the Mahometan princes. He was ſon to Yaſer Al Amid, ſecretary to the council of war under the ſultans of Egypt for 45 years ; and in 1238, when his father died, ſucceeded him in his place. His hiſtory of the Saracens was tranſlated from Arabic into Latin by Erpinius ; and printed in theſe two languages in folio, at Leyden, in 1625. Erpinius died before the publication ; but Golius took care of it, and added a preface. It was dedicated by Erpinius's widow to Dr Andrews, biſhop of Wincheſter.

ELOCUTION. See Oratory, Part III.

ELOGY, a praiſe or panegyric beſtowed on any perſon or thing, in conſideration of its merit. The beauty of elogy conſiſts in an expreſſive brevity. Eulogiums ſhould not have ſo much as one epithet, properly ſo called, nor two words ſynonymous : they ſhould ſtrictly adhere to truth ; for extravagant and improbable elogies rather leſſen the character of the perſon or thing they would extol.

ELOHI, Eloi, or *Elohim*, in ſcripture, one of the names of God. But it is to be obſerved, that angels, princes, great men, judges, and even falſe gods, are ſometimes called by this name. The ſequel of the diſcourſe is what aſſiſts us in judging rightly concerning the true meaning of this word. It is the ſame as *Eloha*. One is the ſingular, the other the plural. Nevertheleſs *Elohim* is often conſtructed in the ſingular number, particularly when the true God is ſpoken of; but when falſe gods are ſpoke of, it is conſtrued rather in the plural.

ELOINED, in law, ſignifies reſtrained or hindered from doing ſomething: thus it is ſaid, that if thoſe within age be eloined, ſo that they cannot ſue perſonally, their next friend ſhall ſue for them.

ELONGATION, in aſtronomy, the digreſſion or receſs of a planet from the ſun, with reſpect to an eye placed on our earth. The term is chiefly uſed in ſpeaking of Venus and Mercury, the arch of a great circle intercepted between either of theſe planets and the ſun being called the *elongation* of that planet from the ſun.

Elongation, in ſurgery, is an imperfect luxation, occaſioned by the ſtretching or lengthening of the ligaments of any part.

ELOPEMENT, in law, is where a married woman departs from her huſband, and cohabits with an adulterer; in which caſe the huſband is not obliged to allow her any alimony out of his eſtate, nor is he chargeable for neceſſaries for her of any kind. However, the bare advertiſing a wife in the gazette, or other public papers, is not a legal notice to perſons in general not to truſt her; though a perſonal notice given by the huſband to particular perſons is ſaid to be good.—An action lies, and large damages may be recovered, againſt a perſon for carrying away and detaining another man's wife.

ELOQUENCE, the art of ſpeaking well, ſo as to affect and perſuade. See Oratory.

ELSHEIMER (Adam), a celebrated painter, born at Francfort on the Maine, in 1574. He was firſt a diſciple of Philip Uffenbach a German; but his deſire of improvement carrying him to Rome, he ſoon became a moſt excellent artiſt in landſcapes, hiſtory, and night-pieces, with ſmall figures. His works are but few; and the great pains he beſtowed in finiſhing them, raiſed their prices ſo high, that they are hardly any where to be found but in the cabinets of princes. He was of a melancholy turn, and ſunk under the embarraſſments of his circumſtances in 1610. James Erneſt Thomas of Landau was his diſciple; and imitated his ſtyle ſo nicely, that their performances are not eaſily diſtinguiſhed.

ELSIMBURG, a port-town of Sweden, in the province of Gothland, and territory of Schonen, ſeated on the ſide of the Sound, over againſt Elſinore. It was formerly a fortreſs belonging to the Danes; but all the fortifications were demoliſhed in 1679, and there is only one tower of a caſtle which remains undemoliſhed. It now belongs to Sweden. E. Long. 13. 20. N. Lat. 56. 2.

ELSINORE, a port-town of Denmark, ſeated on the Sound, in the iſle of Zealand. The Sound is a ſtrait of the Baltic Sea, of which this is one of the quays, for here the Danes take toll of all the merchant ſhips which go to the Baltic. Sometimes two or three hundred veſſels paſs through it in a day. E. Long. 13. 23. N. Lat. 56. 0.

ELVAS, a large town, and one of the beſt and moſt important in Portugal, ſeated in the province of Alentejo, a few miles from the frontiers of Eſtramadura, in Spain. It is built on a mountain, and is ſtrongly fortified with works of free-ſtone. The ſtreets of the town are handſome, and the houſes neat; and there is a ciſtern ſo large, that it will hold water enough to ſupply the whole town ſix months. The water is conveyed to it by a magnificent aqueduct, three miles in length, ſuſtained in ſome places by four or five high arches, one upon another. It was bombarded by the French and Spaniards in 1706, but without effect. It has generally a garriſon of one thouſand men. The king founded an academy here, in 1733, for young gentlemen. W. Long. 7. 28. N. Lat. 38. 39.

ELUL, in ancient chronology, the 12th month of the Jewiſh civil year, and the ſixth of the eccleſiaſtical: it conſiſted of only 29 days, and anſwered pretty nearly to our Auguſt.

ELUTRIATION, in chemiſtry, an operation performed by waſhing ſolid ſubſtances with water, ſtirring them well together, and haſtily pouring off the liquid, while the lighter part remains ſuſpended in it, that it may thereby be ſeparated from the heavier part. By this operation metallic ores are ſeparated from earth, ſtones, and other unmetallic particles adhering to them.

ELY, a city and biſhop's ſee of Cambridgeſhire, ſituated about 12 miles north of Cambridge. E. Long. 15′. N. Lat. 52. 24.

It is a county of itſelf, including the territory around; and has a judge who determines all cauſes civil and criminal within its limits.

ELYOT (Sir Thomas), a gentleman of eminent learning in the 16th century, was educated at Oxford, travelled into foreign countries, and upon his return was introduced to court. His learning recommended him to Henry VIII. who conferred the honour of knighthood on him, and employed him in ſeveral embaſſies; particularly, in 1532, to Rome, about the divorce of queen Catharine, and afterward to Charles V. about 1536. He wrote, *The caſtle of health*, *The governor*, *Banquet of Sapience*, *Of the education of children*, *De rebus memorabilibus Angliæ*, and other books; and was highly eſteemed by all his learned cotemporaries.

ELYSIUM, or Elysian Fields, in heathen mythology, certain plains, abounding with woods, fountains, verdure, and every delightful object; ſuppoſed to be the habitation of heroes and good men after death.

According to ſome, the fable of Elyſium is of Phœnician extraction, or rather founded upon the account of paradiſe delivered in the Scriptures.

ELZEVIR, (Lewis, Bonaventure, Abraham, Lewis, and Daniel), five celebrated printers at Amſterdam and Leyden; who greatly adorned the republic of letters by beautiful editions of the beſt authors of antiquity. Lewis began to be famous at Leyden about the year 1595; and was the firſt who diſtinguiſhed the *v* conſonant from the *u* vowel. Daniel died about the year 1680, and was the laſt of the family who excelled in the printing art. The Elzevirs printed ſeveral catalogues of their editions; but the laſt, publiſhed by

Daniel, is conſiderably enlarged: it was printed at Amſterdam in 1674. The types of theſe printers were ſo elegant, that their name has been given to all beautiful types, particularly of the ſmall kind, ever ſince.

EMANATION, the act of flowing or proceeding from ſome ſource or origin; or the thing that proceeds from that action.

EMANCIPATION, in the Roman law, the ſetting free a ſon from the ſubjection of his father; ſo that whatever moveables he acquires belong in property to him, and not to his father, as before emancipation.

Emancipation puts the ſon in a capacity of managing his own affairs, and of marrying without his father's conſent, tho' a minor. Emancipation differs from manumiſſion, as the latter was the act of a maſter in favour of a ſlave, whereas the former was that of a father in favour of his ſon.

There were two kinds of emancipation: the one tacit, which was by the ſon's being promoted to ſome dignity, by his coming of age, or by his marrying, in all which caſes he became his own maſter of courſe. The other, expreſs; where the father declared before a judge, that he emancipated his ſon. In performing this, the father was firſt to ſell his ſon imaginarily to another, whom they called *pater fiduciarius*, father in truſt; of whom being brought back again by the natural father, he manumitted him before the judge by a verbal declaration.

Emancipation ſtill obtains in France with regard to minors or pupils, who are hereby ſet at liberty to manage their own effects, without the advice or direction of their parents or tutors.

EMARGINATED, among botaniſts. See BOTANY, p. 1276.

EMASCULATION, the act of caſtrating or depriving a male of thoſe parts which characteriſe his ſex. Se CASTRATION, and EUNUCH.

EMBALMING, is the opening a dead body, taking out the inteſtines, and filling the place with odoriferous and deſiccative drugs and ſpices, to prevent its putrifying. The Egyptians excelled all other nations in the art of preſerving bodies from corruption; for ſome that they have embalmed upwards of 2000 years ago, remain whole to this day, and are often brought into other countries as great curioſities. Their manner of embalming was thus: they ſcooped the brains with an iron ſcoop, out at the noſtrils, and threw in medicaments to fill up the vacuum: they alſo took out the entrails, and, having filled the body with myrrh, caſſia, and other ſpices, except frankincenſe, proper to dry up the humours, they pickled it in nitre, where it lay ſoaking for 70 days. The body was then wrapped up in bandages of fine linen, and gums, to make it ſtick like glue; and ſo was delivered to the kindred of the deceaſed, entire in all its features, the very hairs of the eye-lids being preſerved. They uſed to keep the bodies of their anceſtors, thus embalmed, in little houſes magnificently adorned, and took great pleaſure in beholding them, alive as it were, without any change in their ſize, features, or complexion. The Egyptians alſo embalmed birds, &c. The prices for embalming were different; the higheſt was a talent, the next 29 minæ, and ſo decreaſing to a very ſmall matter: but they who had not wherewithal to anſwer this expence, contented themſelves with infuſing, by means of a ſyringe, thro' the fundament, a certain liquor extracted from the cedar; and, leaving it there, wrapped up the body in ſalt of nitre: the oil thus preyed upon the inteſtines, ſo that when they took it out, the inteſtines came away with it, dried, and not in the leaſt putrified: the body being encloſed in nitre, grew dry, and nothing remained beſides the ſkull glued upon the bones.

The method of embalming uſed by the modern Egyptians, according to Maillet, is to waſh the body ſeveral times with roſe-water, which, he elſewhere obſerves, is more fragrant in that country than with us; they afterwards perfume it with incenſe, aloes, and a quantity of other odours, of which they are by no means ſparing; and then they bury the body in a winding ſheet, made partly of ſilk and partly of cotton, and moiſtened, as is ſuppoſed, with ſome ſweet-ſcented water or liquid perfume, though Maillet uſes only the term *moiſtened;* this they cover with another cloth of unmixed cotton, to which they add one of the richeſt ſuits of clothes of the deceaſed. The expence, he ſays, on theſe occaſions, is very great, though nothing like what the genuine embalming coſt in former times.

EMBARGO, in commerce, an arreſt on ſhips or merchandiſe, by public authority; or a prohibition of ſtate, commonly on foreign ſhips, in time of war, to prevent their going out port, ſometimes to prevent their coming in, and ſometimes both, for a limited time.

The king may lay embargoes on ſhips, or employ thoſe of his ſubjects, in time of danger, for the ſervice and defence of the nation: but they muſt not be for the private advantage of a particular trader, or company; and therefore a warrant to ſtay a ſingle ſhip is no legal embargo. No inference can be made from embargoes which are only in war-time; and are a prohibition by advice of council, and not at proſecution of parties. If goods be laden on board, and after an embargo or reſtraint from the prince or ſtate comes forth, and then the maſter of the ſhip breaks ground, or endeavours to ſail, if any damage accrues, he muſt be reſponſible for the ſame; the reaſon is, becauſe his freight is due, and muſt be paid, even tho' the goods be ſeized as contraband.

EMBASSADOR. See AMBASSADOR.

EMBASSY, the office or function of an AMBASSADOR.

EMBDEN, a port-town and city of Germany, capital of a county of the ſame name, now in poſſeſſion of the king of Pruſſia; it is ſituated at the mouth of the river Ens. E. Long. 6. 45. N. Lat. 53. 50.

EMBER-WEEKS, are thoſe wherein the *ember* or *embring days* fall.

In the laws of king Alfred, and thoſe of Canute, thoſe days are called *ymbren*, that is, circular days, from whence the word was probably corrupted into *ember-days:* by the canoniſts they are called *quatuor anni tempora*, the four cardinal ſeaſons, on which the circle of the year turns: and hence Henſhaw takes the word to have been formed, *viz.* by corruption from *temper* of *tempora*.

The ember-days are the Wedneſday, Friday, and Saturday, after Quadrageſima Sunday, after Whitſunday,

ſunday, after Holy-rood day in September, and after St Lucia's day in December: which four times anſwer well enough to the four quarters of the year, Spring, Summer, Autumn, and Winter.

Mr Somner thinks they were originally faſts, inſtituted to beg God's bleſſing on the fruits of the earth. Agreeably to which, Skinner ſuppoſes the word *ember* taken from the aſhes, *embers*, then ſtrewed on the head.

Theſe ember-weeks are now chiefly taken notice of, on account of the ordination of prieſts and deacons; becauſe the canon appoints the Sundays next ſucceeding the ember weeks, for the ſolemn times of ordination: Tho' the biſhops, if they pleaſe, may ordain on any Sunday, or holiday.

EMBERIZA, in ornithology, a genus of birds, belonging to the order of paſſeres. The bill is conical, and the mandibles recede from each other towards the baſe; the inferior mandible has the ſides narrowed inwards, but the upper one is ſtill narrower. There are 24 ſpecies; of which the moſt remarkable are,

1. The nivalis, or great pyed mountain-finch of Ray, and the ſnow-bird of Edwards, has white-wings, but the outer edge of the prime-feathers are black; the tail is black, with three white feathers on each ſide.

Theſe birds are called in Scotland *ſnow-flakes*, from their appearance in hard weather, and in deep ſnows. They arrive in that ſeaſon among the Cheviot-hills, and in the Highlands, in amazing flocks. A few breed in the Highlands, on the ſummit of the higheſt hills, in the ſame places with the *ptarmigans;* but the greateſt numbers migrate from the extreme north. They appear in the Shetland iſlands; then in the Orkneys; and multitudes of them often fall, wearied with their flight, on veſſels in the Pentland Frith. Their appearance is a certain fore-runner of hard weather, and ſtorms of ſnow, being driven by the cold from their common retreats. Their progreſs ſouthward is probably thus; Spitzbergen and Greenland, Hudſon's Bay, the Lapland Alps, Scandinavia, Iceland, the Ferroe Iſles, Shetland, Orkneys, Scotland, and the Cheviot-hills. They viſit at that ſeaſon all parts of the northern hemiſphere, Pruſſia, Auſtria, and Siberia. They arrive lean, and return fat. In Auſtria, they are caught and fed with millet, and, like the ortolan, grow exceſſively fat. In their flights, they keep very cloſe to each other, mingle moſt confuſedly together, and fling themſelves collectively into the form of a ball; at which inſtant the fowler makes great havock among them.

2. The miliaris, or grey emberiza, is of a greyiſh colour, ſpotted with black in the belly, and the orbits are reddiſh. It is the bunting of Engliſh authors, and a bird of Europe.

3. The hortulana, or ortolan, has black wings; the firſt three feathers on the tail are white on the edges, only the two lateral are black outwardly. The orbits of the eyes are naked and yellow; the head is greeniſh, and yellow towards the inferior mandible. It feeds principally upon the panick-graſs; grows very fat; and is reckoned a delicate morſel by certain epicures. It is a bird of Europe.

4. The citrinella, or yellow-hammer, has a blackiſh tail, only the two outward ſide-feathers are marked on the inner edge with a ſharp white ſpot. It is a bird of Europe, and comes about houſes in winter: it builds its neſt on the ground in meadows.

5. The ſchœniclas, or reed-ſparrow, has a black head, a blackiſh-grey body, and a white ſpot on the quill-feathers. It inhabits marſhy places, moſt commonly among reeds, from which it takes its name. Its neſt is worthy of notice for the artful contrivance of it, being faſtened to four reeds, and ſuſpended by them like a hammock, about three feet above the water; the cavity of the neſt is deep, but narrow; and the materials are buſhes, fine bents, and hairs. It lays four or five eggs of a bluiſh white, marked with irregular purpliſh veins, eſpecially on the larger end. It is a bird much admired for its ſong; and, like the nightingale, it ſings in the night.

EMBLEM, ΕΜΒΛΗΜΑ, a kind of painted ænigma, which, repreſenting ſome obvious hiſtory, with reflections underneath, inſtructs us in ſome moral truth or other matter of knowledge. See DEVISE, ÆNIGMA, &c.

Such is that very ſignificant image of Scævola holding his hand in the fire; with the words, *Agere et pati fortiter Romanum eſt*, "To do and ſuffer courageouſly is Roman."

The word is pure Greek, formed of the verb εμϐαλλειν, *to caſt in, to inſert*. Suetonius relates, that Tiberius made the word be eraſed out of the decree of the Roman ſenate, becauſe borrowed from another language.

The emblem is ſomewhat plainer and more obvious than the ænigma.—Gale defines emblem an ingenious picture, repreſenting one thing to the eye, and another to the underſtanding.

The Greeks alſo gave the name EMBLEMS, εμϐληματα, *to inlaid* or Moſaic works, and even to all kinds of ornaments of vaſes, moveables, garments, &c. And the Latins uſed *emblema* in the ſame ſenſe. Accordingly, Cicero reproaching Verres with the ſtatues and fine wrought works he had plundered from the Sicilians, calls the ornaments fixed thereto (and which on occaſion might be ſeparated from them) *emblemata*. Add, that Latin authors frequently compare the figures and ornaments of diſcourſe to theſe *emblemata*. Thus, an ancient Latin poet praiſing an orator, ſays, that all his words were ranged like the pieces in Moſaic:

> *Quam lepide* λεξεις *compoſtæ, ut teſſerulæ omnes,*
> *Arte pavimenti, atque* emblemate *vermiculato.*

With us, emblem ordinarily ſignifies no more than a painting, baſſo relievo, or other repreſentation, intended to hold forth ſome moral or political inſtruction.

What diſtinguiſhes an emblem from a deviſe, is, that the words of an emblem have a full, complete ſenſe of themſelves; nay, all the ſenſe and ſignification which they have together with the figure. But there is a yet further difference between emblem and deviſe: for a *deviſe* is a ſymbol appropriated to ſome perſon, or that expreſſes ſomething which concerns him particularly; whereas an *emblem* is a ſymbol that regards all the world alike.

Theſe differences will be more apparent, from comparing the emblem above quoted, with the deviſe of a candle lighted, and the words, *Juvando conſumor*, "I waſte myſelf in doing good." See DEVISE.

EMBOSSING, or IMBOSSING, in architecture and ſculpture, the forming or faſhioning works in relievo, whether cut with a chiſel or otherwiſe.

Emboſſing is a kind of ſculpture, wherein the figures ſtick out from the plane whereon it is cut: and according as the figures are more or leſs prominent, they are ſaid to be in alto, mezzo, or baſſo, relievo; or high, mean, or low, relief. See ENCHASING.

EMBRASURE, in architecture, the enlargement made of the aperture of a door or window, on the inſide of the wall; its uſe being to give the greater play for the opening of the door or caſement, or to admit the more light.

EMBROCATION, in ſurgery and pharmacy, an external kind of remedy, which conſiſts in an irrigation of the part affected, with ſome proper liquor, as oils, ſpirits, &c. by means of a woollen or linen cloth, or a ſpunge, dipped in the ſame.

EMBROIDERY, a work in gold, or ſilver, or ſilk thread, wrought by the needle upon cloth, ſtuffs, or muſlin, into various figures. In embroidering ſtuffs, the work is performed in a kind of loom; becauſe the more the piece is ſtretched, the eaſier it is worked. As to muſlin, they ſpread it upon a pattern ready deſigned; and ſometimes, before it is ſtretched upon the pattern, it is ſtarched, to make it more eaſy to handle. Embroidery on the loom is leſs tedious than the other, in which, while they work flowers, all the threads of the muſlin, both lengthwiſe and breadthwiſe, muſt be continually counted; but, on the other hand, this laſt is much richer in points, and ſuſceptible of greater variety. Cloths too much milled are ſcarce ſuſceptible of this ornament, and in effect we ſeldom ſee them embroidered. The thinneſt muſlins are left for this purpoſe; and they are embroidered to the greateſt perfection in Saxony: in other parts of Europe, however, they embroider very prettily, and eſpecially in France.

There are ſeveral kinds of embroidery: as, 1. Embroidery on the ſtamp; where the figures are raiſed and rounded, having cotton or parchment put under them to ſupport them. 2. Low embroidery; where the gold and ſilver lie low upon the ſketch, and are ſtitched with ſilk of the ſame colour. 3. Guimped embroidery: this is performed either in gold or ſilver; they firſt make a ſketch upon the cloth, then put on cut vellum, and afterwards ſow on the gold and ſilver with ſilk thread: in this kind of embroidery they often put gold and ſilver cord, tinſel, and ſpangles. 4. Embroidery on both ſides; that which appears on both ſides of the ſtuff. 5. Plain embroidery; where the figures are flat and even, without cords, ſpangles, or other ornaments.

By ſtat. 22. Geo. II. c. 36. no foreign embroidery, or gold and ſilver brocade, ſhall be imported, upon pain of being forfeited and burnt, and penalty of 100l. for each piece. No perſon ſhall ſell, or expoſe to ſale, any foreign embroidery, gold or ſilver thread, lace, fringe, brocade, or make up the ſame into any garment, on pain of having it forfeited and burnt, and penalty of 100l. All ſuch embroidery, &c. may be ſeized and burnt; and the mercer, &c. in whoſe cuſtody it was found, ſhall forfeit 100l.

EMBRUN, or AMBRUN, a city of Dauphiny, in France, near the confines of Piedmont. E. Long. 6. 6. and N. Lat. 44. 35.

EMBRIO, in phyſiology, the firſt rudiments of an animal in the womb, before the ſeveral members are diſtinctly formed; after which period it is denominated a fetus. See GENERATION, and FETUS.

EMERALD, a genus of precious ſtone, very green and tranſparent; and, as to hardneſs, the next after the ruby. The word is formed from the French *eſmeraude*, and that from the Latin *ſmaragdus*, which ſignifies the ſame. Others derive it from the Italian *ſmeraldo*, or the Arabic *zomorrad*.

Our jewellers diſtinguiſh emeralds into two kinds; the oriental, and occidental. The emeralds of the Eaſt-Indies are evidently finer than thoſe of any other part of the world: but our jewellers, ſeldom meeting with theſe, call the American emeralds the oriental; and uſually ſell cryſtal, accidentally tinged with green, under the name of the occidental emerald: theſe being alſo the moſt common, there has grown an opinion among the lapidaries, that the emerald is no harder than the cryſtal; becauſe what they take to be emeralds, are in general only cryſtals.

The genuine emerald, in its moſt perfect ſtate, is perhaps the moſt beautiful of all the gems; it is found of various ſizes, but uſually ſmall; a great number of them are met with of about the ſixteenth part of an inch in diameter, and they are found from this to the ſize of a walnut.

The emerald is of different figures like the diamond and many of the other gems; being ſometimes found in a roundiſh or pebble-like form, but much more frequently in a columnar one, reſembling common cryſtal: the pebble-emeralds are always the hardeſt and brighteſt, but are ſeldom found exceeding the ſize of a pea: the cryſtalliform ones grow ſeveral together, and are often larger: the pebble-kind are found looſe in the earths of mountains, and ſands of rivers; the columnar are found uſually bedded in, or adhering to, a white, opake, and coarſe cryſtalline maſs, and ſometimes to the jaſper or the praſius.

The oriental emerald is of the hardneſs of the ſapphire and ruby, and is ſecond only to the diamond in luſtre and brightneſs: the American is of the hardneſs of the garnet; and the European ſomewhat ſofter than that, yet conſiderably harder than cryſtal: It loſes its colour in the fire, and becomes undiſtinguiſhable from the white ſapphire.

The oriental emeralds are very ſcarce, and at preſent found only in the kingdom of Cambay. Very few of them have of late been imported into Europe, inſomuch that it has been ſuppoſed there were no oriental emeralds; but, lately, ſome few have been brought from Cambay into Italy, that greatly excel the American ones. The American, being what our jewellers call *oriental emeralds*, are found principally about Peru; and the European are principally from Sileſia.

Rough EMERALDS.—Thoſe of the firſt and coarſeſt ſort, called *plaſmes*, for grinding, are worth 27 ſhillings ſterling the marc, or 8 ounces. The demi-morillons, 8l. ſterl. per marc. Good morillons, which are only little pieces, but of fine colour, from 13l. to 15l. per marc. Emeralds, larger than morillons, and called *of the third colour* or *ſort*, are valued at from 50l. to 60l. the marc. Emeralds, called *of the ſecond ſort*, which are in larger and finer pieces than the preceding, are worth from 65l. to 75l. per marc. Laſtly, thoſe of the firſt colour, otherwiſe called *negres cartes*, are worth from 110l. to 115l.

EMERALDS *ready cut, or poliſhed and not cut, being of good ſtone, and a fine colour, are worth,*

	L.	s.
Thoſe weighing one caract, or four grains	0	10
Thoſe of two caracts	1	7
Thoſe of three caracts	2	5
Thoſe of four caracts	3	10
Thoſe of five caracts	4	10
Thoſe of ſix caracts	7	10
Thoſe of ſeven caracts	15	0
Thoſe of eight caracts	19	0
Thoſe of nine caracts	23	0
Thoſe of ten caracts	33	0

To counterfeit EMERALDS: Take of natural cryſtal, four ounces; of red-lead, four ounces; verdigreaſe, forty-eight grains; crocus martis, prepared with vinegar, eight grains: let the whole be finely pulverized and ſifted; put this into a crucible, leaving one inch empty: lute it well, and put it into a potter's furnace, and let it ſtand there as long as they do their pots. When cold, break the crucible; and you will find a matter of a fine emerald colour, which, after it is cut and ſet in gold, will ſurpaſs in beauty an oriental emerald.

EMERY, in natural hiſtory, a rich iron-ore found in large maſſes of no determinate ſhape or ſize, extremely hard, and very heavy. It is uſually of a duſky browniſh red on the ſurface; but when broken, is of a fine bright iron-grey, but not without ſome tinge of redneſs; and is ſpangled all over with ſhining ſpecks, which are ſmall flakes of a foliaceous talc, highly impregnated with iron. It is alſo ſometimes very red, and then uſually contains veins of gold. It makes no efferveſcence with any of the acid menſtruums; and is found in the iſland of Guernſey, in Tuſcany, and many parts of Germany.

Phil. Com. p. 607.

Dr Lewis is of opinion, that ſome kinds of emery may contain the metal called *platina*, and on this ſubject has the following curious obſervations. "Alonſo Barba mentions a ſubſtance called *chumpi;* which is a hard ſtone of the emery kind, participating of iron, of a grey colour ſhining a little, very hard to work, becauſe it reſiſts the fire much, found in Potoſi, Chocaya, and other places, along with blackiſh and reddiſh ores that yield gold. If platina is really found in large maſſes, either generally or only now and then, one might reaſonably expect thoſe maſſes to be ſuch as are here deſcribed.

"Of the ſame kind perhaps alſo is the mineral mentioned by ſeveral authors under the name of Spaniſh emery, *ſmiris Hiſpanica*, which ſhould ſeem, from the accounts given of it, to be no other than platina or its matrix. The *ſmiris* is ſaid to be found in the gold mines, and its exportation prohibited; to contain films or veins of native gold; to be in great requeſt among the alchemiſts; to have been ſometimes uſed for the adulteration of gold; to ſtand, equally with the noble metal, cupellation, quartation, antimony, and the regal cement; and to be ſeparable from it by amalgamation with mercury, which throws out the *ſmiris* and retains the gold; properties ſtrongly characteriſtic of platina, and which do not belong to any known ſubſtance beſides. This debaſement of gold *per extractum ſmiridis Hiſpanici* is mentioned by Becher in his *Minera arenaria*, and ſeveral times hinted at in his *Phyſica ſubterranea*. Both Becher and Stahl indeed call the ſubſtance, which the gold receives from the emery, an earth, whereas platina is undoubtedly a metal; but this does not at all invalidate our ſuppoſition, for they give the name of earth alſo to the ſubſtance which copper receives from calamine in being made into braſs, which is now known to be metallic.

"From theſe obſervations I have been led to ſuſpect, that the European emeries likewiſe might poſſibly participate of platina. If this was certain, it would account ſatisfactorily for the uſe which ſome of the alchemiſts are ſaid to have made of emeries and other ferrugineous ores; and we ſhould no longer doubt, or wonder, that by treating gold with theſe kinds of minerals, they obtained a permanent augmentation; that this augmentation, though it reſiſted lead, antimony, aquafortis, and the regal cement, was ſeparable, as Becher owns it was, by quickſilver; and that, when it exceeded certain limits, it rendered the gold pale and brittle.

"If emery contains platina, I imagined it might be diſcoverable by boiling the powdered mineral in melted lead, and afterwards working off the lead upon a teſt or cupel. The experiment was made with eight ounces of the fineſt powder of common emery, and the ſame quantity of lead; which were covered with black flux to prevent the ſcorification of the lead, and urged with a ſtrong fire for two or three hours. The lead became hard, rigid, of a dark colour, and a granulated texture, as if it had really imbibed ſome platina from the emery; but in cupellation it worked almoſt entirely off, leaving only a bead about the ſize of a ſmall pin's head, which was probably no other than ſilver contained in the lead.

"I repeated the experiment, with ſome variation, thinking to obtain a more perfect reſolution of the emery by vitrifying it with the lead. Two ounces of fine emery, and ſix ounces of minium, were well mixed together, and urged with a ſtrong fire, in a cloſe crucible, for an hour: they melted into an uniform dark browniſh glaſs. The glaſs was powdered, mixed with four ounces of fixt alkaline ſalt and ſome powdered charcoal, and put into a freſh crucible, with ſome common ſalt on the ſurface: The fire was pretty ſtrongly excited; but the fuſion was not ſo perfect as could be wiſhed, and only about two ounces of lead were found revived. This lead had ſuffered nearly the ſame change as that in the foregoing experiment; and, like it, gave no appearance of platina on being cupelled.

"It ſeems to follow from theſe experiments, that the emery employed in them contained no platina; but as it is not to be ſuppoſed that all emeries are of one compoſition, other ſorts may deſerve to be ſubmitted to the ſame trials. As gold is contained in ſome parcels of common minerals, and by no means in all the individuals of any one ſpecies; platina may poſſibly in like manner be found in ſome European ores, though there is not the leaſt footſtep of it in other parcels of the ſame kind of ore."

EMETICS, medicines that induce vomiting.

EMINENCE, a title of honour peculiar to cardinals. See CARDINAL.

EMIR, a title of dignity among the Turks, ſignifying a prince.

This title was firſt given to the caliphs; but when they aſſumed the title of ſultans, that of emir remained to their children; as that of Cæſar among the Romans. At length the title came to be attributed to all who were judged to deſcend from Mahomet by his daughter Fatimah, and who wear the green turban inſtead of the white. The Turks make an obſervation, that the emirs, before their fortieth year, are men of the greateſt gravity, learning, and wiſdom; but after this, if they are not great fools, they diſcover ſome ſigns of levity and ſtupidity. This is interpreted by the Turks as a ſort of divine impulſe in token of their birth and ſanctity. The Turks alſo call the vizirs, baſhaws, or governors of provinces, by this name.

EMISSARY, in a political ſenſe, a perſon employed by another to ſound the opinions of people, ſpread certain reports, or act as a ſpy over other people's actions.

EMISSARY *Veſſels*, in anatomy, the ſame with thoſe more commonly called EXCRETORY.

EMISSION, in medicine, a term uſed chiefly to denote the ejaculation of the ſemen, or ſeed, in the act of coition. See COITION, and GENERATION.

EMMERICK, a rich fortified town of Germany, in the circle of Weſtphalia, and duchy of Cleves. It carries on a good trade with the Dutch, and both Proteſtants and Catholics have the free exerciſe of their religion. The ſtreets are neat and regular, and the houſes tolerably built. It was taken by the French in 1672, and delivered to the elector of Brandenburgh in 1673, under whoſe juriſdiction it now is. It is ſeated near the Rhine. E. Long. 5. 29. N. Lat. 52. 5.

EMMIUS (Ubbo), born at Gretha in Eaſt Frieſland in 1547, was a very learned profeſſor, and choſen rector of the college of Norden in 1579. This ſeminary flouriſhed exceedingly under his care; and declined as viſibly after he was ejected, in 1587, for refuſing to ſubſcribe the Confeſſion of Augſburg. The year after, he was made rector of the college of Leer; and when the city of Groningen confederated with the United Provinces, the magiſtrates appointed him rector of that college: which employment he filled with the higheſt repute near 20 years; until, the college being erected into an univerſity, he was the firſt rector, and one of the chief ornaments of it by his lectures, till his infirmities prevented his public appearance. His wiſdom was equal to his learning; ſo that the governor of Frieſland and Groningen often conſulted him, and ſeldom failed to follow his advice. He wrote *Vetus Græcia illuſtrata*, 3 vols; *Decades Rerum Freſicarum;* and many other valuable works. He died in 1625.

EMOLLIENTS, in medicine and pharmacy, are ſuch remedies as ſheath and ſoften the aſperity of the humours, and relax and ſupple the ſolids at the ſame time.

EMOLUMENT, is properly applied to the profits ariſing daily from an office, or employ. The word is formed of the Latin *emolumentum*, which, according to ſome, primarily ſignifies the profits redounding to the miller from his mill; of *molo, molere*, to grind.—The patent, or other inſtrument, whereby a perſon is preferred to an office, gives him a right to enjoy all the dues, honours, profits, and emoluments belonging thereto.—Emolument is alſo uſed, in a ſomewhat greater latitude, for profit or advantage in the general.

EMOTION *and* PASSION, in the human mind, are thus diſtinguiſhed by a celebrated writer *. An internal motion or agitation of the mind, when it paſſeth away without deſire, is denominated *an emotion:* when deſire follows, the motion or agitation is denominated *a paſſion*. A fine face, for example, raiſeth in me a pleaſant feeling: if that feeling vaniſh without producing any effect, it is in proper language an *emotion;* but if the feeling, by reiterated views of the object, becomes ſufficiently ſtrong to occaſion deſire, it loſes its name of emotion, and acquires that of *paſſion*. The ſame holds in all the other paſſions. The painful feeling raiſed in a ſpectator by a ſlight injury done to a ſtranger, being accompanied with no deſire of revenge, is termed an emotion; but that injury raiſeth in the ſtranger a ſtronger emotion, which being accompanied with deſire of revenge, is a paſſion. External expreſſions of diſtreſs produce in the ſpectator a painful feeling, which being ſometimes ſo ſlight as to paſs away without any effect, is an emotion; but if the feeling be ſo ſtrong as to prompt deſire of affording relief, it is a paſſion, and is termed *pity*. Envy is emulation in exceſs: if the exaltation of a competitor be barely diſagreeable, the painful feeling is an emotion; if it produce deſire to depreſs him, it is a paſſion. See PASSION.

EMPALEMENT, an ancient kind of puniſhment, which conſiſted in thruſting a ſtake up the fundament.

EMPALEMENT *of a Flower*, the ſame with CALIX.

EMPEDOCLES, a celebrated philoſopher and poet, was born at Agrigentum, a city in Sicily, about 444 years before the Chriſtian æra. He followed the Pythagorean philoſophy, and admitted the metempſychoſis. He conſtantly appeared with a crown of gold on his head; to maintain, by this outward pomp, the reputation he had acquired of being a very extraordinary man. Yet Ariſtotle ſays, that he was a great lover of liberty, extremely averſe to ſtate and command, and that he even refuſed a kingdom that was offered him. His principal work was a Treatiſe in verſe on the Nature and Principles of Things. Ariſtotle, Lucretius, and all the ancients, make the moſt magnificent elogiums on his poetry and eloquence. His death is variouſly reported: but the common opinion is, that he leaped into mount Ætna, that he might leave behind him an opinion that he was a god.

EMPEROR, a title of honour among the ancient Romans, conferred on a general that had been victorious; and now made to ſignify a ſovereign prince, or ſupreme ruler of an empire.

The title of emperor adds nothing to the rights of ſovereignty; it only gives pre-eminence above other ſovereigns. The emperors, however, pretend, that the imperial dignity is more eminent than the regal. It is diſputed whether emperors have the power of diſpoſing of the regal title. However this may be, they have ſometimes taken upon them to erect kingdoms: thus it is that Bohemia, Pruſſia, and Poland, are ſaid to have been raiſed to that dignity. In the eaſt, the title of emperor is more frequent than with us; thus the ſovereign princes of China, Mogul, &c. are called emperors. In the weſt, the title has been a long time reſtrained to the emperors of Germany. The firſt who bore it was Charlemagne, who was crowned by Pope Leo III. in 800. And it is to be obſerved, that there

* Elem. of Criticiſm, I. 41.

there was not a foot of land or territory annexed to the emperor's title.

In the year 1723, the Czar of Muſcovy aſſumed the title of emperor of all the Ruſſias. The kings of France were alſo called emperors, when they reigned with their ſons, whom they aſſociated in the crown: thus Hugh Capet was called emperor, and his ſon Robert king. The kings of England were anciently ſtyled emperors, as appears from a charter of king Edgar.

The emperor of Germany is a limited monarch in regard to the empire, though he is an abſolute ſovereign in moſt of his hereditary dominions. The late emperors of the Auſtrian family, having hereditary dominions, enumerated all of them in their title. Charles VI. was ſtyled emperor of the Romans, always auguſt, king of Bohemia and Hungary, archduke of Auſtria, &c.; but the preſent empreſs inheriting thoſe countries, her conſort enjoys only the title of emperor of the Romans, duke of Lorrain and Tuſcany. The emperor creates dukes, marquiſſes, and other noblemen; and he appoints moſt of the officers, civil and military, in the empire: he is elected by the nine electors; and he ſummons the general diet of the empire.

EMPETRUM, BERRY-BEARING HEATH, a genus of the triandria order, belonging to the diœcia claſs of plants. There are two ſpecies; one of which, viz. the nigrum, which bears the crow-crake berries, is a native of Britain. It grows wild on boggy heaths and mountains. Children ſometimes eat the berries; but, when taken in too great quantity, they are apt to occaſion a head-ach. Grouſe feed upon them. When boiled with alum, they afford a dark purple dye. Goats are not fond of it. Cows, ſheep, and horſes refuſe it.

EMPHASIS, in rhetoric, a particular ſtreſs of the voice and action, laid on ſuch parts or words of the oration as the orator wants to enforce upon his audience. See DECLAMATION; ORATORY, Part IV.; and READING, nº iv. v.

EMPHYSEMA, in ſurgery, a windy tumour, generally occaſioned by a fracture of the ribs, and formed by the air inſinuating itſelf, by a ſmall wound, between the ſkin and muſcles, into the ſubſtance of the cellular or adipoſe membrane, ſpreading itſelf afterwards up to the neck, head, belly, and other parts, much after the manner in which butchers blow up their veal.

EMPIRE, IMPERIUM, in political geography, a large extent of land, under the juriſdiction or government of an emperor. See EMPEROR.

The moſt ancient empire we read of, is that of the Aſſyrians, which was ſubverted through the effeminacy of Sardanapalus; the Perſian empire was deſtroyed through the bad conduct of Darius Codomannus; the Grecian empire, by its being diſmembered among the captains of Alexander the Great; and the Roman empire, through the ill management of the laſt emperors of Rome.

Antiquaries diſtinguiſh between the medals of the *upper*, and *lower* or *bas*, *empire*.—The curious only value thoſe of the upper empire, which commences with Cæſar, or Auguſtus, and ends in the year of Chriſt 260.

The lower empire comprehends near 1200 years, reckoning as low as the deſtruction of Conſtantinople in 1453.—They uſually diſtinguiſh two ages, or periods, of the lower empire: the firſt beginning where the upper ends, viz. with Aurelian, and ending with Anaſtaſius, including 200 years; the ſecond beginning with Anaſtaſius, and ending with the Palæologi, which includes 1000 years.

EMPIRE, or *The empire*, uſed abſolutely, and without any addition, ſignifies the empire of Germany; called alſo, in juridical acts and laws, The holy Roman empire. Authors are at a loſs under what form of government to range the empire: ſome will have it a monarchical ſtate, by reaſon all the members thereof are forced to aſk the inveſtiture of their ſtates of the emperor, and to take an oath of fidelity to him. Others will have it an ariſtocratic ſtate, by reaſon the emperor cannot determine any thing without the concurrence of the princes: and, laſtly, others will have the empire to be a monarcho-ariſtocratic ſtate.

EMPIRIC, an appellation given to thoſe phyſicians who conduct themſelves wholly by their own experience, without ſtudying phyſic in a regular way. Some even uſe the term, in a ſtill worſe ſenſe, for a quack who preſcribes at random, without being at all acquainted with the principles of the art.

EMPRESS, the ſpouſe of an emperor, or a woman who governs an empire. See EMPEROR.

EMPROSTHOTONOS, a ſpecies of convulſion, wherein the head bends forward.

EMPYÆMA, in medicine, a diſorder wherein purulent matter is contained in the thorax or breaſt, after an inflammation and ſuppuration of the lungs and pleura. See (*Index* ſubjoined to) MEDICINE.

EMPYREUM, a term uſed by divines for the higheſt heaven, where the bleſſed enjoy the beatific viſion.

EMPYREUMA, in chemiſtry, ſignifies a very diſagreeable ſmell produced from burnt oils. It is often perceived in diſtillations of animal as well as vegetable ſubſtances when they are expoſed to a quick fire.

EMPYREUMATIC OILS. See CHEMISTRY, nº 492.

EMRODS. See HEMORRHOIDS.

EMULATION, a noble jealouſy, between perſons of virtue, or learning, contending for the ſuperiority therein.—The word comes originally from the Greek, αμιλλα, *diſpute*, *conteſt*; whence the Latin *æmulus*, and thence our *emulation*.

Plato obſerves of *emulation*, that it is the daughter of envy. If ſo, there is a deal of difference between the mother and the offspring: the one is a virtue, and the other a vice. Emulation admires great actions, and ſtrives to imitate them; envy refuſes them the praiſes that are their due: emulation is generous, and only thinks of ſurpaſſing a rival; envy is low, and only ſeeks to leſſen him.

EMULGENT, or RENAL, ARTERIES, thoſe which ſupply the kidneys with blood; being ſometimes ſingle, ſometimes double, on each ſide.

EMULSION, a ſoft liquid remedy, of a colour and conſiſtence reſembling milk *.

EMUNCTORY, in anatomy, a general term for all thoſe parts which ſerve to carry off the excrementitious parts of the blood and other humours of the body.

* See *Pharmacy*, nº 910.

dy. Such more eſpecially are the kidneys, bladder, and moſt of the glands.

ENALLAGE, in grammar, is when one word is ſubſtituted for another of the ſame part of ſpeech: A ſubſtantive for an adjective, as *exercitus victor*, for *victorioſus*; *ſcelus*, for *ſceleſtus*: A primitive for a derivative, as *Dardana arma* for *Dardania*: An active for a paſſive, as *nox humida cœlo præcipitat*, for *precipitatur*, &c.

ENAMEL, in general, is a vitrified matter betwixt the parts of which is diſperſed ſome unvitrified matter; hence enamel ought to have all the properties of glaſs except tranſparency.

Enamels have for their baſis a pure cryſtal glaſs or frit, ground up with a fine calx of lead and tin prepared for the purpoſe, with the addition uſually of white ſalt of tartar. Theſe ingredients baked together are the matter of all enamels, which are made by adding colours of this or that kind in powder to this matter, and melting or incorporating them together in a furnace.

For white enamel, Neri (*De Arte Vitriar.*) directs only manganeſe to be added to the matter which conſtitutes the baſis. For azure, zaffer mixed with calx of braſs. For green, calx of braſs with ſcales of iron, or with crocus martis. For black, zaffer with manganeſe or with crocus martis; or manganeſe with tartar. For red, manganeſe, or calx of copper and red tartar. For purple, manganeſe with calx of braſs. For yellow, tartar and manganeſe. And for violet-coloured enamel, manganeſe with thrice-calcined braſs.

In making theſe enamels, the following general cautions are neceſſary to be obſerved. 1. That the pots muſt be glazed with white glaſs, and muſt be ſuch as will bear the fire. 2. That the matter of enamels muſt be very nicely mixed with the colours. 3. When the enamel is good, and the colour well incorporated, it muſt be taken from the fire with a pair of tongs. 4. The general way of making the coloured enamel is this: Powder, ſift, and grind, all the colours very nicely, and firſt mix them with one another, and then with the common matter of enamels: then ſet them in pots in a furnace; and when they are well mixed and incorporated, caſt them into water; and when dry, ſet them in a furnace again to melt; and when melted, take a proof of it. If too deep-coloured, add more of the common matter of enamels; and if too pale, add more of the colours.

Enamels are uſed either in counterfeiting or imitating precious ſtones, in painting in enamel; or by enamellers, jewellers, and goldſmiths, in gold, ſilver, and other metals. The two firſt kinds are uſually prepared by the workmen themſelves, who are employed in theſe arts. That uſed by jewellers, &c. is brought to us chiefly from Venice or Holland, in little cakes of different ſizes, commonly about four inches diameter, having the mark of the maker ſtruck upon it with a puncheon. It pays the pound 1 s. $7\frac{41}{100}$ d. on importation, and draws back 1 s. $5\frac{70}{100}$ d. at the rate of 4 s. per pound.

ENAMELLING, the art of laying enamel upon metals, as gold, ſilver, copper, &c. and of melting it at the fire, or of making divers curious works in it at a lamp. It ſignifies alſo to paint in enamel.

The method of painting in ENAMEL. This is performed on plates of gold or ſilver, and moſt commonly of copper, enamelled with the white enamel; whereon they paint with colours which are melted in the fire, where they take a brightneſs and luſtre like that of glaſs. This painting is the moſt prized of all for its peculiar brightneſs and vivacity, which is very permanent, the force of its colours not being effaced or ſullied with time as in other painting, and continuing always as freſh as when it came out of the workmens hands. It is uſual in miniature; it being the more difficult the larger it is, by reaſon of certain accidents it is liable to in the operation. Enamelling ſhould only be practiſed on plates of gold, the other metals being leſs pure: copper, for inſtance, ſcales with the application, and yields fumes; and ſilver turns the yellow white. Nor muſt the plate be made flat; for in ſuch caſe, the enamel cracks; to avoid which, they uſually forge them a little round or oval, and not too thick. The plate being well and evenly forged, they uſually begin the operation by laying on a couch of white enamel (as we obſerved above) on both ſides, which prevents the metal from ſwelling and bliſtering; and this firſt layer ſerves for the ground of all the other colours. The plate being thus prepared, they begin at firſt by drawing out exactly the ſubject to be painted with red vitriol, mixed with oil of ſpike, marking all parts of the deſign very lightly with a ſmall pencil. After this, the colours (which are to be before ground with water in a mortar of agate extremely fine, and mixed with oil of ſpike ſomewhat thick) are to be laid on, obſerving the mixtures and colours that agree to the different parts of the ſubject; for which it is neceſſary to underſtand painting in miniature. But here the workman muſt be very cautious of the good or bad qualities of the oil of ſpike he employs to mix his colours with, for it is very ſubject to adulterations. See OIL.

Great care muſt likewiſe be taken, that the leaſt duſt imaginable come not to your colours while you are either painting or grinding them; for the leaſt ſpeck, when it is worked up with it, and when the work comes to be put into the reverberatory to be red hot, will leave a hole, and ſo deface the work.

When the colours are all laid, the painting muſt be gently dried over a ſlow fire to evaporate the oil, and the colours afterwards melted to incorporate them with the enamel, making the plate red-hot in a fire like what the enamellers uſe. Afterwards that part of the painting muſt be paſſed over again which the fire hath any thing effaced, ſtrengthening the ſhades and colours, and committing it again to the fire, obſerving the ſame method as before, which is to be repeated till the work be finiſhed.

Method of ENAMELLING *by the Lamp*. Moſt enamelled works are wrought at the fire of a lamp, in which, inſtead of oil, they put melted horſe-greaſe, which they call *caballine oil*. The lamp, which is of copper, or white iron, conſiſts of two pieces; in one of which is a kind of oval plate, ſix inches long, and two high, in which they put the oil and the cotton. The other part, called the *box*, in which the lamp is incloſed, ſerves only to receive the oil which boils over by the force of the fire. This lamp, or, where ſeveral artiſts work together, two or three more lamps are placed on a table of proper height. Under the table, about the middle of its height, is a double pair of organ-bellows, which one of the workmen moves up and down with his foot to quicken the flame of the lamps, which are by this means excited to an incredible degree of vehemence. Grooves made with a gauge in the upper part of the table, and covered with parchment, convey the wind of the bellows to a pipe of glaſs before each lamp; and that the enamellers may not be incommoded with the heat of the lamp, every pipe is covered at ſix inches diſtance with a little tin plate, fixed into the table by a wooden handle. When the works do not require a long blaſt, they only uſe a glaſs pipe, into which they blow with their mouth.

It is incredible to what a degree of fineneſs and delicacy the threads of enamel may be drawn at the lamp. Thoſe which are uſed in making falſe tufts of feathers are ſo fine, that they may be wound on the reel like ſilk or thread. The fictitious jets of all colours, uſed in embroideries, are alſo made of enamel; and that with ſo much art, that every ſmall piece hath its hole to paſs the thread through wherewith it is ſewed. Theſe holes are made by blowing them into long pieces; which they afterwards cut with a proper tool.

It is ſeldom that the Venetian or Dutch enamels are uſed alone: they commonly melt them in an iron-ladle, with an equal part glaſs or cryſtal; and when the two matters are in perfect fuſion, they draw it out into threads of different ſizes, according to the nature of the work. They take it out of the ladle while liquid, with two pieces of broken tobacco-pipes, which they extend from each other at arm's-length. If the thread is required ſtill longer, then another workman holds one end, and continues to draw it out, while the firſt holds the enamel to the flame. Thoſe threads, when cold, are cut into what lengths the workman thinks fit, but commonly from 10 to 12 inches; and as they are all round, if they are required to be flat, they muſt be drawn through a pair of pincers while yet hot. They have alſo another iron inſtrument in form of pincers, to draw out the enamel by the lamp when it is to be worked and diſpoſed in figures. Laſtly, they have glaſs-tubes of various ſizes, ſerving to blow the enamel into various figures, and preſerve the neceſſary vacancies therein; as alſo to ſpare the ſtuff, and form the contours. When the enameller is at work, he ſits before his lamp with his foot on the ſtep that moves on the bellows; and holding in his left hand the work to be enamelled, or the braſs or iron-wires the figures are to be formed on, he directs with his right the enamel thread, which he holds to the flame with a management and patience equally ſurpriſing. There are few things they cannot make or repreſent with enamel; and ſome figures are as well finiſhed, as if done by the moſt ſkilful carvers.

ENARTHROSIS, in anatomy, a ſpecies of DIARTHROSIS.

ENCÆNIA, the name of three ſeveral feaſts celebrated by the Jews in memory of the dedication, or rather purification, of the temple, by Judas Maccabæus, Solomon, and Zorobabel.—This term is likewiſe uſed in church-hiſtory for the dedication of Chriſtian churches.

ENCAMPMENT, the pitching of a CAMP.

ENCANTHIS, in ſurgery, a tubercle ariſing either from the caruncula lachrymalis, or from the adjacent red ſkin; ſometimes ſo large, as to obſtruct not only the puncta lacrymalia, but alſo part of the ſight or pupil itſelf. See SURGERY.

ENCAUSTIC and ENCAUSTUM, the ſame with enamelling and enamel. See ENAMELLING and ENAMEL.

ENCAUSTIC *Painting*, a method of painting made uſe of by the ancients, in which wax was employed to give a gloſs to their colours, and to preſerve them from the injuries of the air, and which ſeems greatly ſuperior to the method of painting with oil, becauſe the wax never changes its colour, but the oil always does, and thus oil paintings never fail to become diſcoloured, and loſe their beauty through age.

The art of encauſtic painting was long loſt. It is but lately revived; and the only authentic account we have of the method of performing it is given in a letter from Mr Joſiah Colebrooke to the earl of Maccleſfield preſident of the Royal Society in 1759.

" The art of painting with burnt wax, (ſays he), has long been loſt to the world. The uſe of it to painters, in the infancy of the art of painting, was of the utmoſt conſequence. Drying oil being unknown, they had nothing to preſerve their colours entire from the injury of damps, and the heat of the ſun: a varniſh of ſome ſort was therefore neceſſary; but they being unacquainted with diſtilled ſpirits, could not, as we now do, diſſolve gums to make a tranſparent coat for their pictures: this invention therefore of burnt wax ſupplied that defect to them; and with this manner of painting, the chambers and other rooms in their houſes were furniſhed: this Pliny calls *encauſtum*, and we *encauſtic painting*.

" The following experiments which I have the honour to lay before your Lordſhip and the Society, were occaſioned by the extract of a letter from the abbe Mazeas, tranſlated by Dr Parſons, and publiſhed in the ſecond part of the XLIXth volume of the Philoſophical Tranſactions, n° 100. concerning the ancient method of painting with burnt wax, revived by count Caylus.

" The count's method was,

" *Firſt*, To rub the cloth or board deſigned for the picture ſimply over with bees-wax.

" *Secondly*, To lay on the colours mixed with common water; but as the colours will not adhere to the wax, the whole picture was firſt rubbed over with (A) Spaniſh chalk, and then the colours are uſed.

" *Thirdly*, When the picture is dry, it is put near the fire, whereby the wax melts, and abſorbs all the colours.

" Exp. I. A piece of oak board was rubbed over with bees wax, firſt againſt the grain of the wood, and then with the grain, to fill up all the pores that re-

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(A) Spaniſh chalk is called by Dr Parſons, in a note, *Spaniſh white*. This is a better kind of whitening than the common, and was the only white that had the name of *Spaniſh* annexed to it, that I could procure, tho' I inquired for it at moſt if not all the colour-ſhops in town.

My friend Mr da Coſta ſhewed me a piece of Spaniſh chalk in his collection, which ſeemed more like a CIMOLIA (tobacco pipe clay), and was the reaſon of my uſing that in one of the experiments.

mained after it had been planed, and afterwards was rubbed over with as much dry Spaniſh white as could be made to ſtick on it. This, on being painted (the colours mixed with water only), ſo clogged the pencil, and mixed ſo unequally with the ground, that it was impoſſible to make even an outline, but what was ſo much thicker in one part than another, that it would not bear ſo much as the name of painting; neither had it any appearance of a picture. However, to purſue the experiment, this was put at a diſtance from the fire, on the hearth, and the wax melted by ſlow degrees: but the Spaniſh white, (though laid as ſmooth as ſo ſoft a body would admit, before the colour was laid on), yet on melting the wax into it, was not ſufficient to hide the grain of the wood, nor ſhew the colours by a proper whiteneſs of the ground; the wax, in rubbing on the board, was unavoidably thicker in ſome parts than in others, and the Spaniſh white the ſame: on this I ſuſpected there muſt be ſome miſtake in the Spaniſh white, and made the inquiry mentioned in the note.

“ To obviate the inequality of the ground in the firſt experiment;

“ Exp. 2. A piece of old wainſcot (oak board) $\frac{1}{4}$ of an inch thick, which, having been part of an old drawer, was not likely to ſhrink on being brought near the fire: this was ſmoothed with a fiſh-ſkin, made quite warm before the fire; and then, with a bruſh dipped in white wax, melted in an earthen pipkin, ſmeared all over, and applied to the fire again, that the wax might be equally thick on all parts of the board, a ground was laid (on the waxed board), with levigated chalk mixed with gum water, (*viz.* gum Arabic diſſolved in water): when it was dry, I painted it with a kind of landſcape; and purſuing the method laid down by count Caylus, brought it gradually to the fire. I fixed the picture on a fire-ſcreen, which would preſerve the heat, and communicate it to the back part of the board. This was placed firſt at the diſtance of three feet from the fire, and brought forwards by ſlow degrees, till it came within one foot of the fire, which made the wax ſwell and bloat up the picture; but as the chalk did not abſorb the wax, the picture fell from the board and left it quite bare.

“ Exp. 3. I mixed three parts white wax, and one part white reſin, hoping the tenacity of the reſin might preſerve the picture. This was laid on a board heated, with a bruſh, as in the former; and the ground was chalk, prepared as before. This was placed horizontally on an iron box, charged with an hot heater, ſhifting it from time to time, that the wax and reſin might penetrate the chalk; and hoping from this poſition, that the ground, bloated by melting the wax, would ſubſide into its proper place; but this, like the other, came from the board, and would not at all adhere.

“ Exp. 4. Prepared chalk four drams, white wax, white reſin, of each a dram, burnt alabaſter half a dram, were all powdered together and ſifted, mixed with ſpirit of moloſſes inſtead of water, and put for a ground on a board ſmeared with wax and reſin, as in Exp. 3. This was alſo placed horizontally on a box-iron, as the former: the picture bliſtered, and was cracked all over; and though removed from the box-iron to an oven moderately heated (in the ſame horizontal poſition), it would not ſubſide, nor become ſmooth. When it was cold, I took an iron ſpatula made warm, and moved it gently over the ſurface of the picture, as if I were to ſpread a plaſter. (This thought occurred, from the board being prepared with wax and reſin, and the ground having the ſame materiols in its compoſition, the force of the ſpatula might make them unite.) This ſucceeded ſo well, as to reduce the ſurface to a tolerable degree of ſmoothneſs; but as the ground was broke off in many places, I repaired it with flake white, mixed up with the yolk of an egg and milk, and repainted it with moloſſes ſpirit (inſtead of water), and then put it into an oven with a moderate degree of heat. In this I found the colours fixed, but darker than when it was at firſt painted; and it would bear being waſhed with water, not rubbed with a wet cloth.

“ Exp. 5. A board (that had been uſed in a former experiment) was ſmeared with wax and reſin, of each equal parts; was wetted with moloſſes ſpirit, to make whitening (or Spaniſh white) mixed with gum-water adhere. This, when dry, was ſcraped with a knife, to make it equally thick in all places. It was put into a warm oven, to make the varniſh incorporate partly with the whitening before it was painted; and it had only a ſmall degree of heat: water only was uſed to mix the colours. This was again put into an oven with a greater degree of heat; but it flaked off from the board: whether it might be owing to the board's having had a ſecond coat of varniſh (the firſt having been ſcraped and melted off), and that the unctuous parts of the wax had ſo entered its pores, that it would not retain a ſecond vaniſh, I cannot tell.

“ Exp. 6. Having miſcarried in theſe trials, I took a new board, planed ſmooth, but not poliſhed either with a fiſh-ſkin or ruſhes: I warmed it, and ſmeared it with wax only; then took *cimolia* (tobacco-pipe clay) diveſted of its ſand, by being diſſolved in water and poured off, leaving the coarſe heavy parts behind. After this was dried and powdered, I mixed it with a ſmall quantity of the yolk of an egg and cow's milk, and made a ground with this on the waxed board: this I was induced to try, by knowing that the yolk of an egg will diſſolve almoſt all unctuous ſubſtances, and make them incorporate with water; and I apprehended, that a ground, thus prepared, would adhere ſo much the more firmly to the board than the former had done, as to prevent its flaking off. The milk, I thought, might anſwer two purpoſes; firſt, by uniting the ground with the wax; and ſecondly, by anſwering the end of ſize, or gum-water, and prevent the colours from ſinking too deep into the ground, or running one into another. When the ground was near dry, I ſmoothed it with a pallet-knife, and waſhed with milk and egg where I had occaſion to make it ſmooth and even: when dry I painted it, mixing the colours with common water; this, on being placed horizontally in an oven, only warm enough to melt the wax, flaked from the board; but held ſo much better together than any of the former, that I paſted part of it on paper.

“ Exp. 7. (B) Flake white mixed with egg and milk, crumbled to pieces in the oven, put on the waxed board, as in the laſt experiment.

The bad ſucceſs which had attended all the former expe-

(B) Flake white is the pureſt ſort of white-lead.

experiments, led to conſider of what uſe the wax was in this kind of painting: and it occurred to me, that it was only as a varniſh to preſerve the colours from fading.

“ In order to try this:

“ Exp. 8. I took what the brick-layers call *fine ſtuff*, or *putty* (c): to this I added a ſmall quantity of burnt alabaſter, to make it dry: this it ſoon did in the open air; but before I put on any colours, I dried it gently by the fire, leſt the colours ſhould run. When it was painted, I warmed it gradually by the fire (to prevent the ground from cracking), till it was very hot. I then took white wax three parts, white reſin one part, melted them in an earthen pipkin, and with a bruſh ſpread them all over the painted board, and kept it cloſe to the fire in a perpendicular ſituation, that what wax and reſin the plaſter would not abſorb might drop off. When it was cold, I found the colours were not altered, either from the heat of the fire, or paſſing the bruſh over them. I then rubbed it with a ſoft linen cloth, and thereby procured a kind of gloſs, which I afterwards increaſed by rubbing it with an hard bruſh; which was ſo far from ſcratching or leaving any marks on the picture, that it became more ſmooth and poliſhed by it.

“ After I had made all the foregoing experiments, in converſation with my honoured and learned friend Dr Kidby, a fellow of this ſociety, I ſaid I had been trying to find out what the encauſtic painting of the ancients was. Upon which he told me, that there was a paſſage in Vitruvius *de Architectura*, relative to that kind of painting; and was ſo good as to tranſcribe it for me from the 7th book, chap. 9. *De minii temperatura.* Vitruvius's words are: *At ſi quis ſubtilior fuerit, & voluerit expolitionem miniaceam ſuum colorem retinere, cum paries expolitus & aridus fuerit, tunc ceram Punicam liquefactam igni, paulo oleo temperatam, ſeta inducat, deinde poſtea carbonibus in ferreo vaſe compoſitis, eam ceram apprime cum pariete, calefaciendo ſudore cogat, fiatque ut peræquetor, deinde cum candela linteiſque puris ſubigat, uti ſigna marmorea nuda curantur. Hæc autem* καυϛις *Græce dicitur. Ita obſtans ceræ Punicæ lorica non patitur, nec lunæ ſplendorem, nec ſolis radios lambendo eripere ex his politionibus colorem.*

Which I thus tranſlate: “ But if any one is more wary, and would have the poliſhing [painting] with vermilion hold its colour, when the wall is painted and dry, let him take Carthaginian [Barbary] wax, melted with a little oil, and rub it on the wall with an hair-pencil; and afterwards let him put live coals into an iron veſſel [chaffing-diſh], and hold it cloſe to the wax, when the wall, by being heated, begins to ſweat; then let it be made ſmooth: afterwards let him rub it with a (D) candle and (E) clean linen rags, in the ſame manner as they do the naked marble ſtatues. This the Greeks call καυϛις. The coat of Carthaginian wax (thus put on) is ſo ſtrong, that it neither ſuffers the moon by night, nor the ſun-beams by day, to deſtroy the colour.”

Being ſatisfied, from this paſſage in Vitruvius, that the manner of uſing wax in Exp. 8. was right, I was now to find if the wax-varniſh, thus burnt into the picture, would bear waſhing. But here I was a little diſappointed: for, rubbing one corner with a wet linen cloth, ſome of the colour came off; but waſhing it with a ſoft hair-pencil dipped in water, and letting it dry without wiping, the colour ſtood very well.

A board painted, as in Exp. 8. was hung in the moſt ſmoaky part of a chimney for a day, and expoſed to the open air in a very foggy night. In the morning the board was ſeemingly wet through, and the water ran off the picture. This was ſuffered to dry without wiping; and the picture had not ſuffered at all from the ſmoke or the dew, either in the ground or the colours: but when dry, by rubbing it, firſt with a ſoft cloth, and afterwards with a bruſh, it recovered its former gloſs.

Suſpecting that ſome tallow might have been mixed with the white wax I had uſed, which might cauſe the colours to come off on being rubbed with a wet cloth, I took yellow wax which had been melted from the honeycomb in a private family, and conſequently not at all adulterated; to three parts of this I added one part reſin, and melted them together.

Exp. 9. Spaniſh white, mixed with fiſh-glue, was put for a ground on a board, and painted with water-colours only. The board was made warm; and then the wax and reſin were put on with a bruſh, and kept cloſe to the fire till the picture had imbibed all the varniſh, and looked dry. When it was cold, I rubbed it firſt with a linen cloth, and then poliſhed it with an hard bruſh.

In theſe experiments I found great difficulties with regard to colours. Many water-colours being made from the juices of plants, have ſome degree of an acid in them; and theſe, when painted on an alkaline ground, as chalk, whitening, *cimolia*, and plaſter, are totally changed in their colours, and from green become brown; which contributes much to make the experiments tedious. I would therefore adviſe the uſe of mineral or metallic colours for this ſort of painting, as moſt likely to preſerve their colour: for although I neutralized Spaniſh white, by fermenting it with vinegar, and afterwards waſhed it very well with water, it did not ſucceed to my wiſh.

“ Theſe experiments, and this paſſage from Vitruvius, will in ſome meaſure explain the obſcurity of part of that paſſage in Pliny which Dr Parſons, in his learned comment on the encauſtic painting with wax, ſeems to deſpair of.

“ *Ceris pingere*, was one ſpecies of encauſtic painting. Ενκαυϛον, *inuſtum*, may be tranſlated, “ forced in by the means of fire, burnt in:” for whatever is forced in by the help of fire can be rendered into Latin by no

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(c) Putty is lime ſlaked, and, while warm, diſſolved in water, and ſtrained through a ſive.

(D) The account of the method of poliſhing [painting] walls coloured with vermilion, gave me great ſatisfaction, as it proved the method I had taken in experiment 8. (which I had tried before I ſaw or knew of this paſſage in Vitruvius) was right. The uſe of the candle, as I apprehend, was to melt the wax on the walls where by accident the bruſh had put on too much, or afford wax where the bruſh had not put on enough, or had left any part bare.

(E) The rubbing the wall with a linen cloth, while warm, will do very well, where there is only one colour to be preſerved; but where there are many, as in a landſcape, it will be apt to take off ſome, or render the colouring rather faint; which I found by wiping the wax off from a painting while it was hot.

other ſignificant word, that I know of, but *inuſtum*. If this is allowed me, and I think I have the authority of Vitrivius (a writer in the Auguſtan age) for it, who ſeems to have wrote from his own knowledge, and not like Pliny, who copied from others much more than he knew himſelf, the difficulty with regard to this kind of painting is ſolved, and the encauſtic with burnt wax recovered to the public.

“ What he means by the next kind he mentions, *in ebore ceſtro id eſt viriculo*, I will not attempt to explain at preſent.

“ The ſhip-painting is more eaſily accounted for: the practice being, in part, continued to this time; and is what is corruptly called *breaming*, for brenning or burning.

“ This is done by reeds ſet on fire, and held under the ſide of a ſhip till it is quite hot; then reſin, tallow, tar, and brimſtone, melted together, and put on with an hair bruſh while the planks remain hot, make ſuch a kind of paint as Pliny deſcribes: which, he ſays, *nec ſole, nec ſale, ventiſque corrumpitur*. As they were ignorant of the uſe of oil painting, they mixed that colour with the wax, &c. which they intended for each particular part of the ſhip, and put it on in the manner above deſcribed.

“ In the pictures painted for theſe experiments, and now laid before your lordſhip and the ſociety, I hope neither the deſign of the landſcape, nor the execution of it, will be ſo much taken into conſideration as the varniſh (which was the thing wanted in this inquiry): and I think that will evince, that the encauſtic painting with burnt wax is fully reſtored by theſe experiments; and tho' not a new invention, yet having been loſt for ſo many ages, and now applied further, and to other purpoſes, than it was by Vitruvius (who confined it to vermilion only), may alſo amount to a new diſcovery, the uſe of which may be a means of preſerving many curious drawings to (F) poſterity: for this kind of painting may be on paper, cloth, or any other ſubſtance that will admit a ground to be laid on it. The proceſs is very ſimple, and is not attended with the diſagreeable ſmell unavoidable in oil-painting, nor with ſome inconveniences inſeparable from that art; and as there is no ſubſtance we know, more durable than wax, it hath the greateſt probability of being laſting.”

ENCEINTE, in fortification, is the wall or rampart which ſurrounds a place, ſometimes compoſed of baſtions or curtains, either faced or lined with brick or ſtone, or only made of earth. The enceinte is ſometimes only flanked by round or ſquare towers, which is called a *Roman wall*.

ENCEPHALI, in medicine, worms generated in the head, where they cauſe ſo great a pain as ſometimes to occaſion diſtraction.

The encephali are very rare; but there are ſome diſeaſes wherein they ſwarm, from whence we are told peſtilential fevers have wholly ariſen. Upon the diſſection of one who died of this fever, a little, ſhort, red worm was found in the head, which malmſey wine, wherein horſe-radiſh had been boiled, could only deſtroy. This medicine was afterwards tried on the ſick, moſt of whom it cured.

The like worms have alſo been taken out by trepanning, and the patient cured. Thoſe worms that generate in the noſe, ears, and teeth, are alſo called *encephali*.

ENCHANTER, a perſon ſuppoſed to practiſe enchantment or faſcination. See FASCINATION, WITCHCRAFT, &c.

ENCHANTER's *Nightſhade*, in botany. See CIRCÆA.

ENCHASING, INCHASING, or *Chaſing*, the art of enriching and beautifying gold, ſilver, and other metal-work, by ſome deſign or figures repreſented thereon in low relievo.

Enchaſing is practiſed only on hollow thin works, as watch-caſes, cane-heads, tweezer-caſes, or the like. It is performed by punching or driving out the metal, to form a figure, from withinſide, ſo as to ſtand out prominent from the plane or ſurface of the metal. In order to this, they provide a number of fine ſteel blocks or puncheons of divers ſizes; and the deſign being drawn on the ſurface of the metal, they apply the inſide upon the heads or tops of theſe blocks, directly under the lines or parts of the figures; then, with a fine hammer, ſtriking on the metal, ſuſtained by the block, the metal yields, and the block makes an indenture or cavity on the inſide, correſponding to which there is a prominence on the outſide, which is to ſtand for that part of the figure.

Thus the workman proceeds to chaſe and finiſh all the parts by the ſucceſſive application of the block and hammer to the ſeveral parts of the deſign. And it is wonderful to conſider with what beauty and juſtneſs, by this ſimple piece of mechaniſm, the artiſts in this kind will repreſent foliages, groteſques, animals, hiſtories, &c.

ENCLITICA, in grammar, particles which are ſo cloſely united with other words, as to ſeem part of them, as in *virumque*, &c.—There are three enclitic particles in Latin, viz. *que*, *ne*, *ve*.

ENCRATITES, in church-hiſtory, heretics who appeared towards the end of the ſecond century: they were called *Encratites*, or *Continentes*, becauſe they gloried in abſtaining from marriage and the uſe of wine and animal-food.

ENCURECK, in natural hiſtory, a venomous inſect found in Perſia, and ſaid to be a kind of tarantula. According to Olearius as quoted by Mr Boyle, it neither ſtings nor bites; but lets fall its venom like a drop of water, which cauſes inſufferable pain in the part for a time, and afterwards ſo profound a ſleep, that nothing can awake the patient except cruſhing one of the creatures on the part affected. It is nevertheleſs ſaid, that the ſheep eat theſe inſects without damage.

ENCYCLOPÆDIA, the ſame with CYCLOPÆDIA.

ENDEMIC, or ENDEMICAL, DISEASES, thoſe to which the inhabitants of particular countries are ſubject more than others, on account of the air, water, ſituation, and manner of living.

ENDIVE, in botany. See CICHORIUM.

(F) A bird drawn by Mr Edwards upon paper, prepared with a ground of whitening and fiſh-glue, firſt painted, and then the wax burnt in, has been ſince ſhewn to the Royal Society. This picture rolls up as eaſily as common paper without cracking the varniſh. At alſo two landſcapes painted in the ſame manner on wood.

ENDLESS, ſomething without an end: thus authors mention endleſs rolls, the endleſs ſcrew, &c.

ENDORSE, in heraldry, an ordinary, containing the eighth part of a pale, which Leigh ſays is only uſed when a pale is between two of them.

ENDORSED, in heraldry, is ſaid of things borne back to back, more uſually called ADOSSE.

ENDOWMENT, in law, denotes the ſettling a dower on a woman: though ſometimes it is uſed, figuratively, for ſettling a proviſion upon a parſon, on the building of a church; or the ſevering a ſufficient portion of tithes for a vicar, when the benefice is appropriated.

ENDYMION, the 12th king of Elis. Being expelled his kingdom, he retired into Caria to mount Latmos, where he ſtudied the heavenly bodies, but chiefly the moon; which gave riſe to the fable of the poets, that he was beloved by the moon, who viſited him every night as he lay aſleep upon the top of that hill.

ENEMY, in law, an alien or foreigner, who publicly invades the kingdom.

ENERGUMENS, in church-hiſtory, perſons ſuppoſed to be poſſeſſed by the devil, concerning whom there were many regulations among the primitive Chriſtians. They were denied baptiſm, and the euchariſt; at leaſt, this was the practice of ſome churches: and though they were under the care of exorciſts, yet it was thought a becoming act of charity, to let them have the public prayers of the church, at which they were permitted to be preſent. See EXORCISM.

ENERGY, a term of Greek origin, ſignifying the power, virtue, or efficacy of a thing. It is alſo uſed, figuratively, to denote emphaſis of ſpeech.

ENFANS PERDUS, the ſame with forlorn-hope. FORLORN.

ENFILADE, in the art of war, is uſed in ſpeaking of trenches, or other places, which may be ſcoured by the enemy's ſhot along their whole length. In conducting the approaches at a ſiege, care muſt be taken that the trenches be not enfiladed from any work of the place. See TRENCHES.

ENFRANCHISEMENT, in law, the incorporating a perſon into any ſociety or body politic.

ENGASTRIMYTHI, in Pagan theology, the Pythians, or prieſteſſes of Apollo, who delivered oracles from within, without any action of the mouth or lips.

The ancient philoſophers, &c. are divided upon the ſubject of the engaſtrimythi. Hippocrates mentions it as a diſeaſe. Others will have it a kind of divination. Others attribute it to the operation or poſſeſſion of an evil ſpirit. And others to art and mechaniſm. M. Scottus maintains that the engaſtrimythi of the ancients were poets, who, when the prieſts could not ſpeak, ſupplied the defect by explaining in verſe what Apollo dictated in the cavity of the baſon on the ſacred tripod.

ENGENDERING, a term ſometimes uſed for the act of producing or forming any thing: thus meteors are ſaid to be engendered in the middle region of the atmoſphere, and worms in the belly.

ENGINE, in mechanics, is a compound machine, made of one or more mechanical powers, as levers, pullies, ſcrews, &c. in order to raiſe, caſt, or ſuſtain any weight, or produce any effect which could not be eaſily effected otherwiſe. The word is formed of the French *engin*, from the Latin *ingenium* "wit;" by reaſon of the ingenuity required in the contrivance of engines to augment the effect of moving powers.

ENGINE *for extinguiſhing Fires*. See HYDROSTATICS, n° 33.

Pile-ENGINE, one contrived for driving piles. See PILE-*Engine*.

Steam-ENGINE, a machine to raiſe water by fire, or rather by the force of water turned into ſteam. See STEAM *Engine*.

ENGINE *for dividing Mathematical Inſtruments*. See RAMSDEN's *Engine*.

ENGINEER, in the military art, an able expert man, who, by a perfect knowledge in mathematics, delineates upon paper, or marks upon the ground, all ſorts of forts, and other works proper for offence and defence. He ſhould underſtand the art of fortification, ſo as to be able, not only to diſcover the defects of a place, but to find a remedy proper for them; as alſo how to make an attack upon, as well as to defend, the place. Engineers are extremely neceſſary for theſe purpoſes: wherefore it is requiſite, that, beſides being ingenious, they ſhould be brave in proportion. When at a ſiege the engineers have narrowly ſurveyed the place, they are to make their report to the general, by acquainting him which part they judge the weakeſt, and where approaches may be made with moſt ſucceſs. Their buſineſs is alſo to delineate the lines of circumvallation and contravallation, taking all the advantages of the ground; to mark out the trenches, places of arms, batteries, and lodgments, taking care that none of their works be flanked or diſcovered from the place. After making a faithful report to the general of what is a-doing, the engineers are to demand a ſufficient number of workmen and utenſils, and whatever elſe is neceſſary.

ENGLAND, the ſouthern diviſion of the iſland of Great Britain. Including Wales, it is of a triangular form, and lies between the 50th and 55th degrees of north latitude, extending about 400 miles in length from ſouth to north, and in ſome places it is 300 miles in breadth. It is bounded by Scotland on the north; by the Engliſh Channel on the ſouth, dividing it from France; by the German Sea on the eaſt; and on the weſt by St George's, or the Iriſh, Channel.

1 Whence peopled.

At what time the iſland of Britain was peopled is uncertain; nor do we know whether the ſouthern or northern parts were firſt inhabited. We have no accounts that can be depended upon before the arrival of Julius Cæſar, and it is certain he found the ſouthern parts full of people of a very warlike diſpoſition. Theſe people, according to Cæſar, were a colony of the Gauls; and this opinion is embraced by moſt of the ancient as well as modern writers. It is chiefly founded on the agreement obſerved by the Romans between the two nations in their cuſtoms, manners, language, religion, government, way of fighting, &c. The more northern inhabitants, according to Tacitus, came from Germany. This he infers from the make of their limbs; but Cæſar ſimply calls them *Aborigines*.

2 Inhabited by 17 different nations.

England, including the principality of Wales, when firſt invaded by the Romans, was divided into 17 petty ſtates. 1. The Danmonii, called alſo *Dunmonii* and *Donmonii*, inhabiting the counties of Cornwal and Devonſhire. 2. The Durotriges, who inhabited the track now called *Dorſetſhire*. 3. The Belgæ poſſeſſed

Somerſetſhire, Wiltſhire, and Hampſhire. 4. The Attrebatii, or inhabitants of Berkſhire. 5. The Regni, whoſe country bordered on that of the Attrebatii, and comprehended Surry, Suſſex, and part of the ſea-coaſt of Hampſhire. 6. The Cantii, inhabiting the county now called *Kent*. 7. The Dobuni are placed by Ptolemy on the north ſide of the Thames, near its head, in the counties of Glouceſterſhire and Oxfordſhire. 8. The Cattieuchlani, *Calyeuchlani*, *Cattidudani*, or *Cathicludani*, inhabited Buckinghamſhire, Bedfordſhire, and Hertfordſhire. 9. The Trinobantes, who poſſeſſed the countries of Eſſex and Middleſex. 10. The Iceni, whoſe country comprehended Suffolk, Norfolk, Cambridge, and Huntingdonſhire. Theſe are by Ptolemy called *Simeni*, and by others *Tigeni*. Camden is of opinion, that they were the ſame whom Cæſar calls *Cenomagni*. 11. The Coritani, whoſe country comprehended Northamptonſhire, Leiceſterſhire, Rutlandſhire, Lincolnſhire, Nottinghamſhire, and Derbyſhire. 12. The Cornavii poſſeſſed Warwickſhire, Worceſterſhire, Staffordſhire, Shropſhire, and Cheſhire. 13. The Silures inhabited the Counties of Radnorſhire, Brecknockſhire, Glamorganſhire, with Herefordſhire and Monmouthſhire. 14. The Demetæ inhabited part of Carmardhinſhire, Pembrokeſhire, and Cardiganſhire. 15. The country of the Ordovices comprehended Montgomeryſhire, Merionethſhire, Caernarvonſhire, Denbighſhire, and Flintſhire. 16. The Brigantes poſſeſſed the countries of Yorkſhire, the biſhopric of Durham, Lancaſhire, Weſtmoreland, and Cumberland. 17. The county of Northumberland was held by the Ottadini, Ottadeni, or Ottalini. Their country, according to ſome, reached from the Tine to the river Forth; though the moſt common opinion is, that it reached only to the Tweed.

The above-mentioned names of theſe nations are plainly Roman, but the etymology of them is not eaſily aſcertained. Some attempt to derive them from words in the Old Britiſh language; but as this ſubject at beſt muſt be very obſcure and uncertain, we ſhall not enter into it.

3
Julius Cæſar undertakes an expedition into Britain.

Before the time of Julius Cæſar, the Romans had ſcarcely any knowledge of Britain; but that conqueror having ſubdued moſt of the Gallic nations on the oppoſite ſide of the channel, began to think of extending his conqueſts by the reduction of Britain. The motive for this expedition, aſcribed to him by Suetonius, was a deſire of enriching himſelf by the Britiſh pearls, which were then very much eſteemed. The pretence, however, which he made uſe of in order to juſtify his invaſion, was, that the Britons had ſent aſſiſtance to the Gauls during his wars with them.

Cæſar undertook his firſt expedition againſt Britain when the ſummer was already far ſpent, and therefore he did not expect to finiſh the conqueſt of the country that campaign. He thought, however, that it would be a conſiderable advantage to view the iſland, and learn ſomething of the manners and cuſtoms of the natives; after which he could more eaſily take ſuch meaſures as would enſure a permanent conqueſt on his return. Having marched all his forces into the country of the Morini, now the province of Picardy, from whence was the ſhorteſt paſſage into Britain; he ordered at the ſame time all the veſſels that lay in the neighbouring ports, and a fleet which he had built the year before for an expedition againſt the Morini, to attend him. The Britons, alarmed at his preparations, ſent ambaſſadors with offers of ſubmiſſion; but Cæſar, though he received them with great kindneſs, did not abandon his intended ſcheme of an invaſion. He waited till the arrival of C. Voluſenus, whom he had ſent out with a ſingle galley to make diſcoveries on the coaſt of Britain. Voluſenus did not think proper to land; but, having made what obſervations he could on the coaſt, returned after five days abſence, and Cæſar immediately ſet ſail for Britain. His force conſiſted of two legions embarked on board 80 tranſports; and he appointed 18 more which lay wind-bound about eight miles off, to convey over the cavalry; but theſe laſt orders were too ſlowly executed, which occaſioned ſome difficulty in his landing.

4
Manners, cuſtoms, &c. of the Britons.

The Britons at this time, according to Cæſar and other Roman hiſtorians, were very numerous, and had their country well ſtocked with cattle. Their houſes reſembled thoſe of the Gauls; and they uſed copper or iron plates weighed by a certain ſtandard inſtead of money. Their towns were a confuſed parcel of huts placed at a ſmall diſtance from one another, generally in the middle of a wood, to which all the avenues were ſlightly guarded with ramparts of earth or with trees. All the nations were in a ſtate of the moſt wretched barbariſm, even when compared with the barbarous Gauls on the continent. The uſe of clothes was ſcarce known in the iſland. Only the inhabitants of the ſouthern coaſt covered their nakedneſs with the ſkins of wild beaſts; and this rather to avoid giving offence to the ſtrangers who came to trade with them, than out of any principle of decency. It was a general cuſtom among the Britons to paint their bodies with the juice of woad; but whether this was deſigned as ornament, or for any other purpoſe, is not known. They ſhaved their beards, all except their upper lip, and wore long hair. They alſo had their wives in common, a cuſtom which made them deteſtable to all other nations.

The arms of the Britons were a ſword, a ſhort lance, and a ſhield. Breaſt-plates and helmets they looked upon rather to be incumbrances, and therefore made no uſe of them. They uſually fought in chariots, ſome of which were armed with ſcythes at the wheels; they were fierce and cruel, and exceedingly blood-thirſty. When driven to diſtreſs, they could ſubſiſt themſelves even on the bark and roots of trees; and Dio Caſſius tells us, that they had ready, on all occaſions, a certain kind of food, of which, if they took but the quantity of a bean, they were not troubled with hunger or thirſt for a conſiderable time after. — The ſouthern nations, however, were ſomewhat more civilized; and the Cantii, or inhabitants of Kent, more ſo than any of the reſt.

5
They oppoſe Cæſar's landing.

All the Britiſh nations at this time were very brave and reſolute, owing to the continual diſſenſions among themſelves. They proved therefore very formidable enemies to the Romans; but the ſame diſſenſions which had taught them the art of war, alſo prevented them from uniting in the defence of their country. As ſoon as they perceived Cæſar's fleet approaching, a number of cavalry and chariots were diſpatched to oppoſe his landing, while a conſiderable body of infantry haſtened after. What chiefly embarraſſed the Romans in their attempt to land, was the largeneſs of their ſhips, which required a conſiderable depth of water. The ſoldiers therefore were obliged to leap into the ſea while loaded with their armour; and at the ſame time to encounter the enemy, who were quite diſengaged, as they either ſtood on dry ground, or waded but a little way into the water. Cæſar perceiving this diſadvantage, ordered his galleys to advance, with their broad ſides towards the ſhore, in order to drive the Britons from the water-ſide with their ſlings and arrows. On this the Britons, ſurpriſed at the galleys, a ſort of ſhipping they had never before ſeen, began to give ground. The fight, however, continued for ſome time, greatly to the diſadvantage of the Romans; till at laſt Cæſar, obſerving the diſtreſs of his men, cauſed ſeveral boats to be manned, and ſent them to the aſſiſtance of thoſe who were moſt expoſed to the enemy's aſſault. The Romans then ſoon got the better of the undiſciplined barbarians, however brave, and made good their landing; but they were unable to purſue the enemy for want of cavalry, which had not yet arrived.

6
They are defeated and ſue for peace.

The Britons were ſo diſheartened with this bad ſucceſs, that they immediately ſent ambaſſadors to ſue for peace; which was granted, on condition of their delivering a certain number of hoſtages for their fidelity. Part of theſe they brought immediately; and promiſed to return in a few days with the reſt, who, they ſaid, lived at ſome diſtance. But, in the mean time, the 18 tranſports which carried Cæſar's cavalry, being driven back by a violent ſtorm, and the fleet which lay in the road being greatly damaged by the ſame, the Britons thought proper to break their engagements. Having therefore privately aſſembled their forces, they fell unexpectedly on the ſeventh legion while at a diſtance from the reſt and buſied in foraging. Cæſar being appriſed of their danger, haſtened to their aſſiſtance with two cohorts, and at laſt repulſed the enemy.—This, however, proved only a temporary deliverance; for the Britons, thinking it would be poſſible for them to cut off all the Romans at once, diſpatched meſſengers to inform ſeveral of the neighbouring nations of the weakneſs of the enemy's forces, and the happy opportunity that offered itſelf of deſtroying all theſe invaders at one blow.—On this, they drew together a great body of horſe and foot, which boldly advanced to the Roman intrenchments. But Cæſar came out to meet them; and the undiſciplined Britons being by no means able to cope with the Romans, were put to flight with great ſlaughter. Having burnt ſeveral towns and villages, the victors returned to their camp, where they were ſoon followed by new deputies from the Britons. Cæſar being in want of horſe, and afraid leſt another ſtorm ſhould deſtroy the remainder of his fleet, granted the Britons a peace, on condition of their ſending him double the number of hoſtages into Gaul which they had before promiſed. The ſame night he ſet ſail, and ſoon arrived ſafe in Gaul.

7
Their treachery.

8
Cæſar returns.

The Britons no ſooner perceived the Romans gone, than, as before, they broke through their engagements. Of all the ſtates who had promiſed to ſend hoſtages, only two performed their promiſes; and this neglect ſo provoked Cæſar, that he determined to return the year following with a far greater force. Having, therefore, cauſed his old veſſels to be refitted, and a great many new ones built, he arrived off the coaſt of Britain with a fleet of 600 ſhips and 28 galleys. The Britons made no oppoſition to his landing; but Cæſar, getting intelligence that an army was aſſembled at no great diſtance, marched in queſt of them. He found them encamped on the banks of a river, ſuppoſed to be the *Stour*, about 12 miles diſtant from the place where he had landed. They attempted to oppoſe his paſſage; but being briſkly attacked by the Roman cavalry, they were obliged to retire into a wood, all the avenues of which were blocked up by trees cut down for that purpoſe. This fortification, however, proved inſufficient to protect them. The ſeventh legion, having caſt themſelves into a teſtudo, and thrown up a mount againſt their works, drove them from their aſylum; but as the day was far ſpent, a purſuit was not thought adviſeable.

9
Defeats the Britons.

Next morning Cæſar, with the greateſt part of his army, which he divided into three bodies, marched out in queſt of the enemy. But when he was already come in ſight of their rear, he was overtaken by meſſengers, who informed him, that his fleet was greatly damaged by a violent ſtorm which had happened the preceding night. This put an end to the purſuit for that time; but Cæſar having employed all the carpenters he had with him, and ſent for others from Gaul, in order to repair the damage, reſolved to prevent miſfortunes of this kind for the future. He therefore drew all his ſhips aſhore, and incloſed them within the fortifications of his camp. This arduous undertaking employed his whole army for 10 days, after which he again ſet out in queſt of the enemy.

The Britons had made the beſt uſe they could of the reſpite afforded them by the ſtorm. They were headed by Caſſibelaunus king of the Trinobantes. He had formerly made war upon his neighbours; and having rendered himſelf terrible to them, was looked upon to be the moſt proper perſon for leading them on againſt the common enemy; and as ſeveral ſtates had now joined their forces, the Britiſh army was very numerous. Their cavalry and chariots attacked the Roman army while on their march; but were repulſed with loſs, and driven into the woods. The Romans purſued them too eagerly, and thus loſt ſome of their own men; which encouraged the Britons to make another fierce attack: but in this alſo they were finally unſucceſsful, and were obliged to retire, though their loſs ſeems not to have been great.

10
Cæſar croſſes the Thames.

Next day the Britons ſuddenly attacked the Roman legions as they were foraging; but meeting with a vigorous reſiſtance, they ſoon betook themſelves to flight. The Romans purſued them ſo cloſely, that having neither time to rally nor get down from their chariots, according to cuſtom, great numbers of them were cut in pieces: and this overthrow had ſuch an effect upon the auxiliaries of Caſſibelaunus, that all of them abandoned him; nor did the Britons ever afterwards engage Cæſar with united forces. Cæſar, purſuing his victory, marched towards the Thames, with a deſign to croſs that river, and enter the territories of the Trinobantes. The river was fordable only at one place, and that not without great difficulty; but when he came to it, he found the enemy's forces drawn up in a conſiderable body on the oppoſite bank, which was fortified with ſharp ſtakes. They had likewiſe driven many ſtakes of the ſame kind into the bottom of the river, the tops of which were covered with water. Theſe ſtakes are viſible to this day at a place called *Walton* in Surry. They are made of oak; and though they have been ſo long in the water, are as hard as Brazil, and as black as jet; and have ſometimes been pulled out in order to make knife-handles of them.

11 Gives the Britons frequent overthrows.

Cæſar was not at all diſmayed at theſe difficulties, which he had intelligence of by priſoners and deſerters. He ordered the cavalry to enter firſt, and the foot to follow. His orders were obeyed, and the ſoldiers advanced with ſuch reſolution; that though the infantry were up to the chin in water, the enemy, unable to ſuſtain their aſſault, abandoned the bank and fled. After this defeat Caſſibelaunus himſelf deſpaired of ſucceſs, and therefore diſmiſſed all his forces except about 4000 chariots, with which he obſerved the motions of the Romans, harraſſing them by cutting off ſtraggling parties, &c. This, however, was not ſufficient to keep up the ſpirits of his countrymen. On the contrary, they depoſed him from the kingdom, and choſe Mandubratius, whoſe father had been murdered by Caſſibelaunus, who thereupon uſurped the kingdom. The young prince had fled to Cæſar, who gave him protection; and the Trinobantes now offered to ſubmit to the conqueror, provided he would give them Mandubratius for their king.

Cæſar readily complied with the requeſt of the Trinobantes upon their ſending him 40 hoſtages: and the ſubmiſſion of the Trinobantes was ſoon followed by that of other ſtates and tribes; for each of the 17 nations already mentioned were compoſed of ſeveral different tribes, of which no particular account can be given.—Cæſar next marched to Verulamium, or Canterbury, which was Caſſibelaunus's capital, and which he ſtill kept poſſeſſion of; but, tho' the place was ſtrongly fortified both by nature and art, the Britons were unable to bear the aſſault of the Romans, and therefore ſoon fled out at one of the avenues. Many were taken as they attempted to make their eſcape, and many more cut in pieces.

After this loſs, Caſſibelaunus, as his laſt reſource, found means to draw into confederacy with him four kings of the Cantii. But, though Cæſar gives them the title of kings, it is probable that they were only petty princes, tributary to the king of that nation. Their names were Cingetorix, Corvilius, Taximagulus, and Segonax. Theſe, having raiſed what forces they could, attacked the camp where the ſhips were laid up: but the Romans having made a ſally, repulſed them with great ſlaughter, and then returned to their trenches without any loſs; after which, Caſſibelaunus thought proper to ſubmit to the conqueror. As the ſummer was already far ſpent, Cæſar hearkened to his propoſals. A peace was concluded on the following terms, *viz.* that the Britons ſhould pay an annual tribute to the Romans, that Caſſibelaunus ſhould leave Mandubratius in peaceable poſſeſſion of his dominions, that he ſhould not moleſt the Trinobantes, and that he ſhould deliver a certain number of hoſtages. Theſe terms being agreed to, Cæſar ſet ſail with his whole fleet from Britain, to which he never returned.

12 He leaves the iſland altogether.

Such is the account given by Cæſar himſelf of his two expeditions into Britain; but other authors have ſpoken very doubtfully of his victories in this iſland. Dio Caſſius tells us, that the Britons utterly defeated the Roman infantry, but were at laſt put in diſorder by their cavalry. Horace and Tibullus, in many parts of their works, ſpeak of the Britons as a people not yet conquered. Tacitus ſays, that Cæſar rather ſhewed the Romans the way to Britain, than put them in poſſeſſion of it; and Lucan tells us plainly, that Cæſar turned his back to the Britons and fled. This laſt, however, conſidering the conſummate military genius of Cæſar, is by no means probable. That he left Britain during the winter, was, in all probability, to prevent inſurrections among the Gauls, which might very readily have happened; and that he did not return to finiſh his conqueſt can be no wonder, ſeeing his ambition would certainly be more gratified by being called emperor of Rome, than conqueror of Britain.

13 Why the war with Romans was renewed.

The departure of Julius Cæſar, which happened about 53 years before Chriſt, left the Britons without any fear of a foreign enemy. We are not, therefore, to imagine, that they would regard their promiſes of paying tribute; nor was it probably demanded for a good number of years afterwards. Auguſtus, however, when he had got himſelf fully eſtabliſhed on the throne, had twice a deſign of invading Britain and forcing the inhabitants to pay the tribute promiſed to Julius Cæſar. Both times, however, he was prevented by revolts in different provinces in the empire, ſo that the Britons ſtill continued to enjoy their liberty. They thought proper, however, to court the favour of the Romans as much as they could by pretended ſubmiſſions; but, in the reign of Claudius, the Romans ſet about reducing the Britons to ſubjection in good earneſt. The occaſion of this war is related by Dio Caſſius as follows. "Cunobelinus, the third in ſucceſſion from Caſſibelaunus, being dead, his two ſons, Togodumnus and Caractacus, ſucceeded to the throne; but whether they reigned jointly or ſeparately, is not known. In their reign one Bericus, of whom we alſo know very little, being driven out of the iſland for attempting to raiſe a ſedition, fled with ſome of his partiſans to Rome, and perſuaded Claudius to make war on his countrymen. The Britons, on the other hand, reſented the behaviour of Claudius in receiving theſe vagabonds, and therefore prohibited all intercourſe with the Romans. A much ſmaller offence than this would have been ſufficient at any time to provoke that haughty nation to declare war. An army was therefore immediately ordered into Britain, under the command of Plautius prætor in Gaul. The ſoldiers at firſt refuſed to embark, from a ſuperſtitious notion, that they were going to be ſent without the compaſs of the world; and this mutiny being related to the Britons, they did not make the neceſſary preparations for their own defence. The Roman ſoldiers were ſoon brought to a ſenſe of their duty; and ſet out from three different ports, in order to land in three different places of Britain at once. Being driven back by contrary winds, their fears began to return; but they reſumed their courage on the appearance of a meteor ſhooting from the eaſt, which they imagined was ſent from heaven to direct their courſe. They landed without oppoſition; and the Britons, not having drawn together a ſufficient army, kept in ſmall bodies behind their marſhes, and in woods, in order to ſpin out the war till winter; which they imagined Plautius would, like Cæſar, ſpend in Gaul.

14 The Britons defeated.

The Roman general marched firſt in queſt of the two kings Togodumnus and Caractacus; both of whom he found out, and defeated one after another. He then reduced part of the Dobuni, at that time ſubject to the Cattieuchlani; and, leaving a garriſon to keep them in awe, he advanced to a river where the Britons lay careleſsly encamped, ſuppoſing that the Romans could not paſs it without a bridge. But the Germans in the Roman army had been accuſtomed to ſwim acroſs the ſtrongeſt currents in their heavy armour. They therefore paſſed the river firſt; and having, according to their orders, fallen only upon the enemy's horſes which drew their chariots, theſe formidable machines were rendered entirely uſeleſs; and the Britons were put to flight as ſoon as another part of the forces could paſs the river.

The Britons were not diſheartened with this defeat, but engaged the Romans next day with great bravery. Victory continued long doubtful; but at length the Romans prevailed, and the Britons were forced to betake themſelves to flight. This battle is thought to have been fought on the banks of the Severn. From thence the Britons fled to the mouth of the Thames. They were cloſely purſued by the Romans; but the latter being unacquainted with the flats and ſhallows of the river, were often in great danger. The Germans, however, croſſed the river by ſwimming as before, and the reſt on a bridge ſomewhat higher; ſo that the Britons were in a ſhort time ſurrounded on all ſides, and great numbers of them cut in pieces. Many of the Romans, alſo, purſuing the fugitives with too great eagerneſs, were loſt in the marſhes.—In one of theſe battles Togodumnus was killed; but the Britons were ſo far from being diſheartened by his death, that they ſhewed more eagerneſs than ever to oppoſe the Romans, in order to revenge it. Plautius, therefore, did not think proper to penetrate farther into the country, but contented himſelf with putting garriſons in the places he had already conquered. He then wrote to the emperor himſelf; who no ſooner received an account of his ſucceſs, than he ſet out for Britain; where, having landed after a ſhort voyage, he joined Plautius on the banks of the Thames.

15 udius ives in tain.

Soon after the arrival of Claudius, the Roman army paſſed the Thames, attacked the Britiſh army, and totally defeated it. The conſequence of this was the taking of Cunobelinus's capital, and the ſubmiſſion of ſeveral of the neighbouring ſtates. The emperor, however, did not make a long ſtay in the iſland, but left Plautius to purſue his conqueſts. This he did with ſuch ſucceſs, that, on his return to Rome, he was met without the gates by the emperor himſelf, who, at his ſolemn entry, gave him the right hand.—The Britons ſeem to have made a very obſtinate reſiſtance to the Roman arms about this time. Veſpaſian, who was afterwards emperor, is ſaid to have fought 30 battles with them. The exploits of Titus his ſon are alſo much celebrated by the Roman hiſtorians.

In the ninth year of Claudius, P. Oſtorius Scapula was ſent into Britain. By far the greater part of the 17 nations formerly mentioned were at this time unconquered. Some of theſe had broken into the Roman territories; but Oſtorius falling unexpectedly upon them, put great numbers to the ſword, and diſperſed the reſt. To prevent them for the future from making inroads into the territories of the Romans or their allies, he built ſeveral forts on the Severn, the Avon, and the Nen, reducing the country ſouth of theſe rivers to a Roman province. This ſo highly offended the Iceni, that, being joined by the neighbouring nations, they raiſed a conſiderable army, and encamped in an advantageous ſituation, in order to prevent the Romans from penetrating farther into the iſland. Oſtorius, however, ſoon advanced againſt them. The Romans, as uſual, got the victory, and the enemy were purſued with great ſlaughter. The Roman general then, having quelled an inſurrection among the Brigantes, led his army againſt the Silures.

16 Caractacus defeated and taken priſoner.

They were headed by their king Caractacus, a moſt renowned warrior. He ſhewed his military talents by chooſing a very advantageous place for engaging the enemy. Tacitus tells us, "it was on the ridge of an exceeding ſteep mountain; and, where the ſides of it were inclining and acceſſible, he reared walls of ſtone for a rampart. At the foot of the mountain flowed a river dangerous to be forded, and an army of men guarded his entrenchments." This hill is thought to be one called *Caer-Caradoc* in Shropſhire, ſituated near the conflux of the rivers Colun and Teme, and where the remains of ancient entrenchments are ſtill viſible.—On the approach of the enemy, Caractacus drew up his troops in order of battle, animating them with the following ſpeech, according to Tacitus. "That from this day, and this battle, they muſt date their liberty reſcued, or their ſlavery for ever eſtabliſhed. He then invoked the ſhades of thoſe heroes who had expelled Cæſar the dictator; thoſe brave men by whoſe valour they ſtill enjoyed freedom from Roman tribute and taxes, and by which their wives and children were as yet preſerved from proſtitution." The whole army then took a ſolemn oath either to conquer or die, and prepared for the charge with the moſt terrible ſhouts. Oſtorius was ſomewhat diſmayed when he conſidered the uncommon fierceneſs of the enemy, and the other difficulties which he had to encounter. He led on his men, however, to the charge; and the Romans were attended with their uſual good fortune. The Britons were put to flight. Vaſt numbers fell on the field of battle and in the purſuit, and many more were taken priſoners. Among the latter were the wife, the daughter, and the brothers, of Caractacus. The unfortunate prince himſelf fled to Cartiſmundua queen of the Brigantes, by whom he was delivered up to the Roman general, who ſent him in chains to Rome. Caractacus bore his misfortunes with magnanimity; and when he came before the emperor, addreſſed him in the following terms.

17 His ſpeech to the Roman emperor.

"If my moderation in proſperity, O Claudius! had been as conſpicuous as my birth and fortune, I ſhould now have entered this city as a friend, and not as a priſoner; nor would you have diſdained the friendſhip of a prince deſcended from ſuch illuſtrious anceſtors, and governing ſo many nations. My preſent condition, I own, is to you honourable, to me humiliating. I was lately poſſeſſed of ſubjects, horſes, arms, and riches. Can you be ſurpriſed that I endeavoured to preſerve them? If you Romans have a deſire to arrive at univerſal monarchy, muſt all nations, to gratify you, tamely ſubmit to ſervitude? If I had ſubmitted without a ſtruggle, how much would it have diminiſhed the luſtre of my fall, and of your victory?

And now, if you reſolve to put me to death, my ſtory will ſoon be buried in oblivion; but if you think proper to preſerve my life, I ſhall remain a laſting monument of your clemency."—This ſpeech had ſuch an effect upon Claudius, that he immediately pardoned Caractacus and his whole family, and commanded them to be ſet at liberty.

18 General revolt of the Britons.

The Silures, notwithſtanding this terrible blow, continued the war with great vigour, and gained conſiderable advantages over the Romans; which ſo much affected Oſtorius, that he died of grief. He was ſucceeded by A. Didius, who reſtrained the incurſions of the Silures, but was not able to reſtore Cartiſmundua queen of the Brigantes, who had been depoſed by her ſubjects. Didius was ſucceeded by Veranius, and he by Suetonius Paulinus, who reduced the iſland of ANGLESEY, as related under that article. But while Paulinus was employed in the conqueſt of this iſland, he was alarmed by the news of an almoſt univerſal revolt among thoſe nations which had ſubmitted to the Romans. The Britons, tho' conquered, had ſtill a deſire of returning to their former ſtate of independence; and the Roman yoke became every day more unſupportable to them through the inſolence and oppreſſions of the Roman ſoldiers. The Britons had been long diſcontented, and were already in a very proper diſpoſition for a revolt, when an event happened which kindled theſe diſcontents into an open flame. Praſutagus, king of the Iceni, a prince renowned for opulence and grandeur, had, by his laſt will, left the Roman emperor joint-heir with his two daughters, in hopes of obtaining his favour and protection by ſo great an obligation. But the event turned out very different. No ſooner was he dead, than his houſes and poſſeſſions were all plundered by the Roman ſoldiers. The queen Boadicea remonſtrated againſt this injuſtice; but, inſtead of obtaining any redreſs, ſhe herſelf was publicly whipped, her daughters raviſhed, and all the relations of the late king reduced to ſlavery. The whole country alſo was plundered, and all the chiefs of the Iceni deprived of their poſſeſſions.

Boadicea was a woman of too haughty a ſpirit tamely to bear ſuch indignities. She therefore perſuaded the Iceni to take up arms, which they very readily did. Then, being joined by the Trinobantes, and ſome other nations, they poured like a torrent on the Roman colonies. Every thing was deſtroyed with fire and ſword. The ninth legion, which had been left for the defence of the country under Petilius Cerealis was defeated, the infantry totally cut in pieces, and the commander himſelf with the cavalry eſcaped with the utmoſt difficulty. Suetonius, alarmed at this news, mediately left Angleſey, and marched with the greateſt expedition to London. The inhabitants were overjoyed at his arrival, and uſed their utmoſt endeavours to detain him for their defence. But he refuſed to ſtay, and in a ſhort time left the place, notwithſtanding the intreaties of the inhabitants. The whole city lamented his departure; and they had reaſon. Suetonius was ſcarce gone, when Boadicea with her Britons entered, and put all they found in it to the ſword. None were taken priſoners, nor was any ſex or age ſpared, and many were tortured in the moſt cruel manner. Seventy thouſand perſons are ſaid to have periſhed on this occaſion at London and other Roman colonies.

19 They deſtroy 70,000 Romans.

20 They are utterly defeated.

The Britons, now elated with ſucceſs, aſſembled from all quarters in great numbers, ſo that Boadicea's army ſoon amounted to 230,000 men. They deſpiſed the Romans; and became ſo confident of victory, that they brought their wives and children along with them in waggons to be ſpectators of the deſtruction of their enemies. The event was what might naturally have been judged from ſuch ill-judged confidence. The Britons were overthrown with moſt terrible ſlaughter, no fewer than 80,000 being killed in the battle and purſuit; while the Romans had not above 400 killed, and not many more wounded. Boadicea, not able to ſurvive ſo great a calamity, put an end to her life by poiſon.

By this overthrow the Britons who had once been ſubdued were thoroughly prevented from raiſing any more inſurrections, and even thoſe who had not yet ſubmitted to the Roman yoke ſeemed to be intimidated from making incurſions into their dominions. Nothing remarkable therefore happened in Britain for ſome time. In the time of Veſpaſian, Petilius Cerealis being appointed governor of Britain, attacked the Brigantes, defeated them in ſeveral battles, and reduced great part of their country. He was ſucceeded by Julius Frontinus; who not only maintained the conqueſts of his predeceſſor, but reduced entirely the warlike nation of the Silures. Frontinus was ſucceeded by the celebrated Cneius Julius Agricola, who completed the conqueſt of all the Southern Britons.

21 Britain conquered by Agricola.

Juſt before the arrival of Agricola, the Ordovices had cut in pieces a band of horſe ſtationed on their confines, after which the whole nation had taken arms. The ſummer was pretty far ſpent, and the Roman army was quite ſeparated and diſperſed, the ſoldiers having aſſured themſelves of reſt for the remaining part of the year. Agricola, however, was no ſooner landed, than, having drawn together his legions, he marched againſt the enemy without delay. The Britons kept upon the ridges of the mountains; but Agricola led them in perſon up the aſcents. The Romans were victorious, and ſuch a terrible ſlaughter was made of the Britons that almoſt all the whole nation of Ordovices was cut off. Without giving the enemy time to recover from the terror which this overthrow had occaſioned, Agricola reſolved upon the immediate reduction of Angleſey, which had been loſt by the revolt of Boadicea. Being deſtitute of ſhips, he detached a choſen body of auxiliaries who knew the fords, and were accuſtomed to manage their arms and horſes in the water. The Britons who had expected a fleet and tranſports, were ſo terrified by the appearance of the Roman forces on their iſland, that they immediately ſubmitted, and Angleſey was once more reſtored to the Romans.

With the conqueſt of Angleſey, ended the firſt campaign of Agricola; and he employed the winter in reconciling the Britons to the Roman yoke. In this he met with ſuch ſucceſs, through his wiſe and equitable conduct, that the Britons, barbarous as they were, began to prefer a life of ſecurity and peace, to that independency which they had formerly enjoyed, and which continually expoſed them to the tumults and calamities of war. The ſucceeding campaigns of Agricola were attended with equal ſucceſs; he not only ſubdued the 17 nations inhabiting England, but carried the Roman arms almoſt to the extremity of Scotland. He alſo cauſed his fleet to ſail round the iſland, and diſcovered the Orcades, or Orkney iſlands, which had before been unknown to the reſt of the world. His expedition took him up about ſix years, and was completed in the year of Chriſt 84.

Had this commander been continued in Britain, it is probable that both Scotland and England would have been permanently ſubdued; but he was recalled by Domitian in the year 85, and we are then almoſt totally in the dark about the Britiſh affairs till the reign of the emperor Adrian. During this interval the Caledonians had taken arms, and not only refuſed ſubjection to the Roman power themſelves, but ravaged the territories of the Britons who continued faithful to them. Adrian, for what reaſon is not well known, abandoned to them the whole track lying between the Tyne and the Forth. At the ſame time, in order to reſtrain them from making incurſions into the Roman territories, he built a wall 80 miles in length from the river Eden in Cumberland to the Tyne in Northumberland *. He was ſucceeded by Antoninus Pius, in whoſe reign the Brigantes revolted; and the Caledonians, having in ſeveral places broken down the wall built by Adrian, began anew to ravage the Roman territories. Againſt them the emperor ſent Lollius Urbicus, who reduced the Brigantes; and having defeated the northern nations, confined them within narrower bounds, by a new wall †, extending probably between the Friths of Forth and Clyde. From the time of Antoninus to that of Severus, the Roman dominions in Britain continued to be much infeſted by the inroads of the northern nations. That emperor divided Britain into two governments, the ſouthern and northern; but the governor of the northern diviſion was ſo harraſſed by continual incurſions of the Caledonians, that he was at length obliged to purchaſe a peace with money. The Caledonians kept the treaty for 15 years; after which, breaking into the Roman territories anew, they committed terrible ravages. Virius Lupus the governor, not being in a condition to withſtand them, acquainted the emperor with his diſtreſs, intreating him to ſend powerful and ſpeedy ſupplies. Upon this Severus reſolved to put an end to the perpetual incurſions of the enemy by making a complete conqueſt of their country; for which purpoſe he ſet out for Britain, together with his two ſons Caracalla and Geta, at the head of a numerous army. The Caledonians no ſooner heard of his arrival, than they ſent ambaſſadors offering to conclude a peace upon honourable terms. But theſe the emperor detained till he was ready to take the field, and then diſmiſſed them without granting their requeſt.

22 pedition Severus Bri-

As ſoon as the ſeaſon was fit for action, Severus marched into the territories of the Caledonians, where he put all to fire and ſword. He advanced even to the moſt northerly parts of the iſland; and though no battle was fought in this expedition, yet through the continual ambuſcades of the enemy, and the inhoſpitable nature of the country, he is ſaid to have loſt 50,000 men. At laſt the Caledonians were obliged to ſue for peace; which was granted them on condition of their yielding part of their country, and delivering up their arms. After this the emperor returned to York, leaving his ſon Caracalla to command the army, and finiſh the new wall which had been begun between the friths of Forth and Clyde. But, the emperor being taken ill at York, the Caledonians no ſooner heard of his indiſpoſition, than they again took up arms. This provoked Severus to ſuch a degree, that he commanded his ſon Caracalla to enter their country anew with the whole army, and to put all he met to the ſword without diſtinction of ſex or age. Before theſe orders, however, could be put in execution, his two ſons, having concluded a ſhameful peace with the Caledonians, returned to Rome.

A long chaſm now takes place in the hiſtory of the Roman dominions in Britain. In the beginning of Diocleſian's reign, Carauſius a native of Gaul, paſſing over into Britain, took upon him the title of *emperor*, and was acknowledged by all the troops quartered here. He was, however, killed in a battle with one of Conſtantius's officers, after he had enjoyed the ſovereignty for ſix or ſeven years. Conſtantine the Great began his reign in this iſland; and returned ſoon after he had left it, probably with a deſign to put a ſtop to the daily incurſions of the Caledonians. He altered the diviſion of that part of Britain ſubject to the Romans. Severus had divided it only into two provinces; but Conſtantine increaſed the number to three; *viz.* Britannia Prima, Britannia Secunda, and Maxima Cæſarienſis; and this laſt was afterwards divided into two, *viz.* Maxima Cæſarienſis and Flavia Cæſarienſis. The removal of the imperial ſeat from Rome to Conſtantinople, which happened in the reign of Conſtantine, gave the northern nations an opportunity of making frequent incurſions into the Roman provinces; the emperor having carried with him, firſt into Gaul, and then into the Eaſt, not only moſt of the Roman troops, but likewiſe the flower of the Britiſh youth.

About the latter end of the reign of Conſtantius ſon to Conſtantine the Great, the government of the province of Britain and other Weſtern parts of the empire, was committed to Julian, afterwards called the *apoſtate*. While he was in his winter-quarters at Paris, he was informed that the Scots and Picts, about this time firſt diſtinguiſhed by theſe names, had broken into the Roman territories and committed every where dreadful ravages. Againſt them Julian diſpatched a body of troops under the command of Lupicinius. He embarked from Bologne in the depth of winter, but was no ſooner arrived at London than he was recalled; the enemy having probably found means to appeaſe Julian by their ſubmiſſions. To the reign of Valentinian I. theſe nations ſtill continued to infeſt the Roman territories in Britain, and had now reduced the country to a moſt deplorable condition by their continual ravages. Valentinian ſent againſt them Theodoſius, father to the emperor of that name. That general having divided his forces into ſeveral bodies, advanced againſt the enemy who were roving up and down the country. The Scots and Picts were obliged to yield to the ſuperior valour and diſcipline of the Romans. Great numbers were cut in pieces, they were forced to abandon all the booty and priſoners they had taken, and to retire beyond the friths of Forth and Clyde. Theodoſius then entered London in triumph, and reſtored that city to its former ſplendour, which had ſuffered greatly by the former incurſions of the northern Britons. To reſtrain them from breaking anew into the provinces,

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* See *Adrian*.

† See *Antoninus's Wall*.

England.

Theodoſius built ſeveral forts or caſtles between the two friths; and having thus recovered all the country between Adrian's wall and the friths of Forth and Clyde, he formed of it a fifth province which he called *Valentia*.

Though Britain was now reduced to a ſtate of temporary tranquillity, yet as the Roman empire was daily declining, it is not to be ſuppoſed that ſufficient care could be taken to ſecure ſuch a diſtant province. In the reign of the emperor Honorius, the provincial Britons found themſelves annoyed not only by the Scots and Picts, but alſo by the depredations of the Saxons who began to commit ravages on the ſea-coaſts. By the care, however, of Stilicho, prime miniſter to Honorius, matters were once more ſettled, and a particular officer was appointed to guard the coaſt againſt the attempts of the Saxons, with the title of *Comes limitis Saxonici*. But, not long after, the empire being over-run by barbarians, moſt of the Roman troops quartered in Britain were recalled, and the country left quite open to the attacks of the Scots and Picts. Upon this the provincials expecting no more aſſiſtance from Honorius, reſolved to ſet up an emperor of their own. Accordingly they inveſted with the imperial dignity one *Mark*, an officer of great credit among them. Him they murdered in a few days, and placed on the throne one Gratian a native of Britain. After a reign of four months, Gratian underwent the fate of his predeceſſor; and was ſucceeded by *Conſtantine*, a common ſoldier, who was choſen merely for the ſake of his name. He ſeems, however, to have been a man of ſome knowledge and experience in war. He drove the Scots and Picts beyond the limits of the Roman territories; but being elated with this ſucceſs, he would now be ſatisfied with nothing leſs than the conqueſt of the whole Roman empire. He therefore paſſed over into Gaul; and took with him not only the few Roman forces that had been left, but ſuch of the provincial Britons as were moſt accuſtomed to arms. That unhappy people, being now left entirely defenceleſs, were harraſſed in the moſt cruel manner by their enemies; who broke into the country, and deſtroyed all with fire and ſword. In this miſerable ſituation they continued from the year 407, when the uſurper Conſtantine paſſed over into Gaul, till the year 410. Having during the laſt three years frequently implored aſſiſtance from Rome without receiving any, they now reſolved to withdraw their allegiance from an empire which was no longer able to protect them. Honorius himſelf applauded their conduct; and adviſed them by letters to provide for their own ſafety, which was in effect an implicit reſignation of the ſovereignty of the iſland.

23 The Britons chooſe an emperor of their own.

The provincial Britons now regained their liberty; but they had loſt the martial ſpirit which had at firſt rendered them ſo formidable to the Romans. They ſeem, however, to have met with ſome ſucceſs in their firſt enterpriſes; for Zoſimus tells us, that they delivered their cities from the inſults of an haughty enemy. But, being at laſt overpowered, they were again obliged to have recourſe to the Roman emperor, to whom they promiſed a moſt perfect ſubmiſſion, provided they were delivered from the hands of their mercileſs and implacable enemies. Honorius, touched with compaſſion, ſent a legion to their relief. The Roman forces landed in Britain unexpectedly; and having deſtroyed great numbers of the Scots and Picts, they drove them beyond the Friths of Forth and Dunbritton. After this they adviſed the natives to build a wall on the iſthmus from ſea to ſea, and to reaſſume their courage, and defend themſelves from their enemies by their own valour. The Romans then quitted the country; being obliged to return, in order to repulſe thoſe barbarians who had broken into the empire from all quarters.

24 Implore the aſſiſtance of the Romans.

The Britons immediately ſet about building the wall, as they had been deſired, with great alacrity. But, as it was conſtructed only of turf, the Scots and Picts ſoon broke it down in ſeveral places; and, pouring in upon the defenceleſs and effeminate provincials, committed more cruel ravages than ever. At laſt, after very many and grievous calamities, the latter ſent ambaſſadors once more to Rome. Theſe appeared with their garments rent, and duſt on their heads; and at laſt prevailed on the emperor, by their earneſt intreaties, to ſend another legion to their relief. The troops arrived in Britain before the enemy had the leaſt knowledge of their having ſet ſail. They were therefore quite unprepared for an attack, and roving up and down the country in the utmoſt diſorder. The Romans made a terrible havock among them, and drove the remainder into their own country. As Honorius had ſent them not with any ambitious view of retaining the iſland in ſubjection, but merely out of compaſſion to the unhappy provincials, the Romans told them, they had now no farther aſſiſtance to expect from them. They informed them, that the legion muſt immediately return to the continent, to protect the empire from the barbarians, who had extended their ravages almoſt to every part of it; and therefore, that they muſt now take their laſt farewel of Britain, and totally abandon the iſland. After this declaration, Gallio, the commander of the Roman troops, exhorted the provincials to defend themſelves, by fighting bravely for their country, wives, and children, and what ought to be dearer than life itſelf, their liberty; telling them, at the ſame time, that their enemies were no ſtronger than themſelves, provided they would but lay aſide their fears, and exert their ancient courage and reſolution. That they might the better withſtand the attacks of the enemy, he adviſed them to build a wall not of turf, but of ſtone; offering to aſſiſt them with his ſoldiers, and to direct them himſelf in the execution. Upon this the Britons immediately fell to work; and with the aſſiſtance of the Romans, finiſhed it in a ſhort time, though it was no leſs than eight feet thick, and twelve feet in height. It is thought to have been built on the ſame place where Severus's wall formerly ſtood. Towers were alſo built at convenient diſtances on the eaſt coaſt, to prevent the deſcents of the Saxons and other barbarians that came from Germany. Gallio employed the reſt of his time in teaching the provincials the art of war. He left them patterns of the Roman weapons, which he alſo taught them to make; and after many encouraging exhortations, he took his laſt farewel of Britain, to which the Romans never returned.—There is a great diſagreement among chronologers as to the year in which the Romans finally abandoned Britain; ſome placing it in 422; others in 423, or 426; and ſome in 431, 435, or 437.

25 Send ambaſſadors a ſecond time to Rome.

26 Britain finally abandoned by the Romans.

The final departure of the Romans was no ſooner known to the Scots and Picts, than they poured in upon the provincial Britons from all quarters, like hungry wolves breaking into a ſheep-fold. When the Scots approached the new-built wall, they found it completely finiſhed, and guarded by great numbers of armed men. But ſo little had the provincial Britons profited by the military inſtructions of the Romans, that, inſtead of placing proper guards and centinels, and relieving one another by turns, their whole number had ſtaid ſeveral days and nights upon the ramparts without intermiſſion. Being therefore quite benumbed and wearied out, they were able to make but very little reſiſtance. Many were pulled down with hooks from the battlements, and daſhed in pieces. The reſt were driven from their ſtations with ſhowers of darts and arrows. They betook themſelves to flight; but that could not ſave them. The Scots and Picts purſued them cloſe, made a dreadful havock among the fugitives, and took poſſeſſion of the frontier towns, which they found deſerted by the inhabitants. As they now met with no more oppoſition, they over-ran the whole country, putting every thing to fire and ſword. Their ravages ſoon occaſioned a famine; and this was followed by a kind of civil war. The provincials, unable to ſupport themſelves, were obliged to plunder each other of the little the common enemy had left them. The whole country at laſt became ſo incapable of ſupporting thoſe who were left in it, that many fled into the woods, in order to ſubſiſt themſelves there by hunting.

26 Britons miſerably harraſſed by the Scots and Picts.

In this extremity of diſtreſs, they had once more recourſe to the Romans; and wrote in the moſt mournful ſtyle that can poſſibly be imagined to Aetius, who was then conſul the third time. Their letter they directed thus: "The groans of the Britons to the conſul Aetius." The contents of this letter were anſwerable to the direction. "The barbarians, (ſay they,) drive us to the ſea; the ſea drives us back to the barbarians; between which we have only the choice of two deaths, either to be ſwallowed up by the waves, or to be cruelly maſſacred by the enemy."

27 mplore the ſſiſtance of he Ro- ans.

To this letter the Roman general gave no ſatisfactory anſwer, and the provincials were thereupon reduced to deſpair. Great numbers of them fled over to Armorica, where they ſettled along with others who had formerly gone over with an uſurper called *Maximus;* while others ſubmitted to the Scots and Picts. Some, however, more reſolute than the reſt, had once more recourſe to arms. They ſallied out in parties from the woods and caves where they had been obliged to hide themſelves, and, falling unexpectedly on the enemy, cut great numbers of them in pieces, and obliged the reſt to retire. Having thus obtained ſome reſpite, they began again to cultivate their lands; which, having lain fallow for a long time, now produced all ſorts of corn in the greateſt plenty. This plenty, according to the hiſtorian Gildas, occaſioned the moſt conſummate wickedneſs and corruption of manners among all ranks of men. The clergy, ſays he, who ſhould have reclaimed the laity by their example, proved the ringleaders in every vice; being addicted to drunkenneſs, contention, envy, &c.—It is poſſible, however, that this deſcription might be exaggerated by Gildas, who was himſelf a monk. But, however this was, the Britons had not long enjoyed peace, when they were alarmed by a report, that the Scots and Picts were about to return with a far greater force than before, utterly to extirpate the name of their ſouthern neighbours, and ſeize upon the country for themſelves. This report threw them into a terrible conſternation; and, to add to the reſt of their misfortunes, they were now viſited by a dreadful plague, which raged with ſuch violence, that the living were ſcarce ſufficient to bury the dead. The contagion no ſooner ceaſed, than they found their country invaded by the Scots and Picts, who deſtroyed every thing with fire and ſword; ſo that the provincials were ſoon reduced to the ſame miſerable ſtate they had formerly been in.

28 y at laſt ulſe r ene- s.

29 Are again threatened with an invaſion.

At this time the chief, if not the only, king of the ſouthern diviſion of Britain, was one *Vortigern.* He is ſaid to have been a cruel, debauched tyrant, regardleſs of the public welfare, and totally incapable of promoting it. Being now rouſed from his inſenſibility, however, by a ſenſe of his own danger, he ſummoned a council of the chief men of the nation, in order to deliberate about the proper means for delivering the country from thoſe calamities under which it groaned. In this council the moſt pernicious meaſure was adopted that could poſſibly have been reſolved on; namely, to invite to their aſſiſtance the *Saxons*, a people famous for their piracies and cruelty, and juſtly dreaded by the Britons themſelves*. This fatal expedient being agreed upon, ambaſſadors were immediately diſpatched into Germany with advantageous propoſals to the Saxons in caſe they would come over to their aſſiſtance.

30 They reſolve to call in the Saxons.

The Britiſh ambaſſadors ſoon arrived in Germany, and, according to Witichind, a Saxon hiſtorian of the ninth century, made the following ſpeech before an aſſembly of the Saxons.—"Illuſtrious Saxons, the fame of your victories having reached our ears, the diſtreſſed Britons, harraſſed by the continual inroads of a neighbouring enemy, ſend us to implore your aſſiſtance. We have a fertile and ſpacious country, which we are commanded to ſubmit to you. We have hitherto lived under the protection of the Roman empire; but our ancient maſters having abandoned us, we know no nation more powerful than you, and better able to protect us. We therefore recur to your valour. Forſake us not in our diſtreſs, and we ſhall readily ſubmit to what terms you yourſelves ſhall think fit to preſcribe to us."—If this abject and ſhameful ſpeech was really made, it muſt give us a very ſtrange idea of the national ſpirit of the provincial Britons at that time. It is, however, probable that the whole is a fiction deſigned only to excuſe the perfidious treatment which theſe Britons afterwards received from the Saxons. The moſt reſpectable even of the Saxon hiſtorians make no mention of ſuch a ſpeech: and it is certain, that when the Saxons themſelves wanted to quarrel with the Britons, they never inſiſted upon the promiſe made by the Britiſh ambaſſadors; which they moſt certainly would have done, had any ſuch promiſe ever been made.

The Britiſh ambaſſadors were very favourably received by the Saxons. The latter embraced their propoſal with joy; and the rather, becauſe their ſoothſayers foretold that they ſhould plunder their Britiſh allies for 150 years, and reign over them for twice that time. Three long ſhips, in the Saxon language called *chiules*, were therefore fitted out, under the conduct of Hengiſt and Horſa. Theſe were two brothers much celebrated

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* See *Saxons.*

31 The Saxons arrive in Britain, and defeat the Scots and Picts.

brated both for their valour and nobility. They were ſons of Witigiſil ſaid to be great-grandſon to the Saxon god Woden; a circumſtance which added much to their authority. Having embarked about 1600 men on board their three veſſels, the two brothers arrived in the iſle of Thanet, in the year 449 or 450. They were received by the inhabitants with the greateſt demonſtrations of joy: the iſle in which they had landed was immediately appointed for their habitation; and a league was concluded, in virtue of which the Saxons were to defend the provincial Britons againſt all foreign enemies; and the provincials were to allow the Saxons pay and maintenance, beſides the place allotted them for their abode. Soon after their arrival, king Vortigern led them againſt the northern nations who had lately broke into the kingdom, and advanced as far as Stanford in the county of Lincolnſhire. Here a battle was fought, in which the Scots and Picts were utterly defeated, and obliged to relinquiſh their booty.

Vortigern was ſo highly pleaſed with the behaviour of his new allies, that he beſtowed large poſſeſſions in the country they had newly delivered, upon the two commanders Hengiſt and Horſa. It is ſaid, that, even at this time, Hengiſt was taken with the wealth and fertility of the country; and at the ſame time obſerving the inhabitants to be quite enervated with luxury, began to entertain hopes of conquering part of it. He therefore, with Vortigern's conſent, invited over ſome more of his countrymen; giving them notice at the ſame time of the fruitfulneſs of the country, the effeminacy of the inhabitants, and how eaſily a conqueſt might be effected.

32 New ſupplies of Saxons arrive.

The Saxons readily complied with the invitation; and, in 452, as many more arrived in 17 veſſels, as, with thoſe already in Britain, made up an army of 5000 men. Along with theſe, according to Nennius, came over Rowena the daughter of Hengiſt. Vortigern fell in love with this lady; and in order to obtain her in marriage, divorced his lawful wife. Hengiſt pretended to be averſe to the match; but Vortigern obtained his conſent by inveſting him with the ſovereignty of Kent. The Saxon hiſtorians, indeed, make no mention of Rowena; but rather inſinuate, that their countrymen made themſelves maſters of Kent by force of arms. It ſeems moſt probable, however, that Vortigern had as yet continued in friendſhip with the Saxons, and even put more confidence in them than in his own ſubjects. For, not long after the arrival of this firſt reinforcement, Hengiſt obtained leave to ſend for a ſecond, in order, as was pretended, to defend the king from the attempts of his rebellious ſubjects, as well as of the Scots and Picts. Theſe embarked in 40 ſhips, under the command of Octa and Ebuſa, the ſon and nephew, or, according to ſome, the brother and nephew of Hengiſt. They landed at the Orkney iſlands; and having ravaged them, as well as all the northern coaſts of Scotland, they conquered ſeveral places beyond the Frith, and at laſt obtained leave to ſettle in Northumberland.

The pretence made for this ſettlement was, that the Saxons under Octa and Ebuſa might defend the northern frontiers of the kingdom, as thoſe under Hengiſt and Horſa did the ſouthern parts. Many more Saxons were, under various pretences, invited over; till at laſt the countries from which they came were in a manner depopulated. And now their numbers being greatly increaſed, the Saxons began to quarrel with the natives. They demanded larger allowances of corn, and other proviſions; threatening to lay waſte the whole country if their demands were not complied with. The Britons, inſtead of complying with theſe demands, deſired them to return home, ſince their numbers exceeded what they were able to maintain. Upon this, the Saxons concluded a peace with the Scots and Picts; and, turning their arms againſt the unhappy provincials, over-ran the whole country. The Saxons committed every where the greateſt cruelties. All buildings, whether public or private, they levelled with the ground. The cities were pillaged and burnt; and the people maſſacred without diſtinction of ſex or age, and that in ſuch numbers, that the living ſcarce ſufficed to bury the dead. Some of thoſe who eſcaped the general ſlaughter, took refuge among inacceſſible rocks and mountains; but there great numbers periſhed with hunger, or were forced to ſurrender themſelves as ſlaves to their enemies. Some croſſed the ſea and ſettled either in Holland, or in Armorica, now the province of Brittany in France.

33 They quarrel with the Britons.

34 They are defeated and driven out by Vortimer.

Vortigern, we are told by Nennius, was ſo far from being reclaimed by theſe calamities, that he added inceſt to his other crimes, and married his own daughter. At laſt, his own ſubjects, provoked at his enormous wickedneſs, and the partiality he ſhewed to the Saxons, depoſed him, and raiſed his ſon Vortimer to the throne. He was a young man of great valour, and willingly undertook the defence of his diſtreſſed country. He firſt fell upon the Saxons with what troops he could aſſemble, and drove them into the iſle of Thanet. Here they were beſieged, till, being reinforced by freſh ſupplies from Germany, they opened themſelves a way through the Britiſh troops. Vortimer, however, was not yet diſheartened. He engaged the Saxons on the banks of the Derwent in Kent, where he obtained a complete victory, and cut in pieces great numbers of the enemy. Another battle was fought at Aylesford in Kent. Some aſcribe the victory at this time to the Saxons, and ſome to the Britons. It is certain, however, that Horſa the brother of Hengiſt was killed in this engagement. He is ſaid to have been buried at a place in the neighbourhood, which from him obtained the name of *Horſted*.—A third battle was fought, in which the victory was uncertain, as is alſo the place where it happened. The fourth battle, however, according to Nennius, proved deciſive in favour of the Britons. Vortimer engaged his enemies, according to ſome, at Folkſtone, according to others, at a place called *Stonar*, in the iſle of Thanet. The Saxons were defeated with great ſlaughter, and driven back to their ſhips. So complete is this victory ſaid to have been, that the Saxons quitted the iſland, without making any attempt upon it for five years afterwards. Theſe battles, however, reſt entirely upon the credit of Nennius, and the hiſtorians who have followed him. They are taken notice of neither by Gildas nor Bede. The former only acquaints us, that the Saxons retired. This, by moſt hiſtorians, is underſtood of their returning home; tho' it is poſſible he might mean no more, than that, after they had laid waſte the country, they retired into the territories allotted them by Vortigern, in Kent and Northumberland.

Vortimer is ſaid to have died after a reign of ſix years. On his death-bed, he deſired his ſervants to bury him near the place where the Saxons uſed to land; being perſuaded, that the virtue of his bones would effectually prevent them from ever touching the Britiſh ſhore. This command, however, was neglected; and Vortimer was buried at Lincoln, according to ſome, or London, according to others.—Hengiſt was no ſooner informed of his death, than he invaded Britain anew with a numerous body of Saxons. He was oppoſed by Vortigern, who had been reſtored to the throne after the death of his ſon Vortimer. Several battles were fought on this occaſion; but at laſt the provincials being overthrown at a place called *Crecanford*, with the loſs of 4000 men, were obliged to abandon Kent to their enemies, and retire to London. This happened about the year 458 or 459, and from this time moſt hiſtorians date the erection of the firſt Saxon kingdom in Britain, *viz.* that of Kent. Hengiſt aſſumed the title of *king*, and choſe Eſk his ſon for his colleague.

35 They return and defeat the Britons, and erect a kingdom in Kent.

The Britons under Vortigern ſtill continued the war. Hengiſt finding himſelf unable to gain a deciſive advantage over them in the field, had recourſe to treachery. He pretended to be deſirous of concluding a peace with the Britiſh monarch, and of renewing his ancient friendſhip with him; and therefore required an interview. To this Vortigern readily conſented, and accepted of an entertainment prepared for him by Hengiſt. The king was attended by 300 nobility all unarmed, but the Saxons had concealed daggers below their garments. The Britiſh nobility were all treacherouſly maſſacred in the height of their mirth; Vortigern himſelf was taken and put in fetters; nor could his liberty be procured, but by ceding to the Saxons thoſe provinces now called *Eſſex*, *Suſſex*, and *Middleſex*. Thus the Saxons got ſuch a footing in Britain that they could never afterwards be expelled. Vortigern, after being ſet at liberty, is ſaid to have retired to a vaſt wilderneſs near the fall of the Wye in Radnorſhire, where he was ſome time after conſumed by lightning, together with a city called *Kaer Gourtigern* which he had built in that place.

36 Treachery of the Saxons.

On the retreat of Vortigern, the command of the Britiſh forces devolved upon Aurelius Ambroſius, or, as Gildas calls him, Ambroſius Aurelianus. He was a Roman, and perhaps the laſt that remained in the iſland. He is ſaid to have gained ſeveral victories over the Saxons. Notwithſtanding this, however, they ſtill continued to gain ground; and in the year 491, the foundation of a ſecond Saxon kingdom was laid in Britain. This at firſt comprehended only the county of Suſſex, but ſoon after extended over moſt of the counties lying ſouth of the Humber. It was called the *kingdom of the South Saxons*.

37
ſecond Sax-
n king-
om.

The German nations being now informed of the good ſucceſs which had attended the Saxons in Britain, new adventurers daily flocked over to ſhare the good fortune of the others. They were chiefly compoſed of three nations, the Saxons, Angles, and Jutes. All of theſe paſſed under the common appellation ſometimes of *Saxons*, ſometimes of *Angles*. They ſpoke the ſame language, and agreed very much in their cuſtoms and inſtitutions, ſo that all of them were naturally led to combine againſt the natives. The moſt active of theſe adventurers was *Cerdic* a Saxon, ſaid to be the tenth in deſcent from Woden. He landed with his ſon Cenric, and as many men as he could convey in five ſhips, at Yarmouth in Norfolk. The provincials immediately attacked him with great vigour; but after a ſhort engagement, they were totally defeated. Many other battles were fought, the event of which was always favourable to the Saxons, ſo that the Britons were forced to abandon their ſea-coaſts to them.

In 497, *Porta*, another Saxon, with his two ſons *Bleda* and *Magla*, arrived at *Portſmouth*, ſo called, as ſome imagine, from this chieftain. The provincials, under the command of a young prince a native of the country, attempted to oppoſe the landing of the Saxons: but his army was defeated with great ſlaughter, and he himſelf killed in the engagement; after which Porta made himſelf maſter of all the neighbouring country. The progreſs of Cerdic, however, alarmed the Britons more than that of all the other Saxon princes. About the year 508, therefore, *Nazaleod*, ſtyled, by Henry of Huntingdon, the *greateſt of all the Britiſh kings*, aſſembled almoſt the whole ſtrength of the provincial Britons in order to drive him out of the iſland. Cerdic on the other hand took care to ſtrengthen himſelf by procuring aſſiſtance from all the Saxons already in the iſland. He then advanced againſt the Britons, commanding the right wing himſelf, and his ſon Cenric the left. As the two armies drew near each other, Nazaleod perceived the enemy's right wing to be much ſtronger than the left. He therefore attacked it with the flower of his army; and after an obſtinate reſiſtance, obliged Cerdic to ſave himſelf by flight. Being too eager in the purſuit, however, Cenric fell upon his rear, and the battle was renewed with great vigour. The Britiſh army was at laſt entirely defeated; and 5000 men, among whom was Nazaleod himſelf, were left dead on the ſpot.

38 Nazaleod king of Britain defeated and killed.

Who ſucceeded Nazaleod in the kingdom of Britain, is not known. The Welſh annals leave an interregnum of about ſix years; after which they place the beginning of the reign of Arthur, the moſt renowned Britiſh prince mentioned in hiſtory. The hiſtory of king Arthur is ſo much obſcured by fables, and many abſurd, romantic, and ridiculous ſtories, that ſome have ſuppoſed that no ſuch perſon ever exiſted. On this ſubject *Milton* gives the following reaſons againſt the exiſtence of king Arthur: 1. He is not mentioned by Gildas, or any Britiſh hiſtorian except Nennius, who is allowed on all hands to have been a very credulous writer, and to have publiſhed a great many fables. 2. Tho' William of Malmeſbury and Henry of Huntingdon have both related his exploits, yet the latter took all he wrote from Nennius; and the former, either from the ſame fabulous writer, or ſome Monkiſh legends in the abbey of Glaſtenbury; for both theſe writers flouriſhed ſeveral centuries after king Arthur. 3. In the pretended hiſtory of Geoffroy of Monmouth, ſuch contradictions occur concerning this monarch's victories in France, Scotland, Ireland, Norway, Italy, &c. as muſt cauſe us to look upon him as an hero altogether fabulous and romantic.

39 Whether ſuch a perſon as king Arthur ever exiſted.

In anſwer to this it has been ſaid, 1. That his not being mentioned by Gildas cannot ſeem ſtrange to us, ſeeing it was not that author's deſign to write an exact hiſtory of his country, but only to give a ſhort account of the cauſes of its ruin by the Scots, Picts, and Saxons. He had alſo a particular ſyſtem to ſupport, namely, That the ruin of the Britons was owing to the judgments of God upon them for their wickedneſs. He lies therefore under a great temptation to conceal the ſucceſſes of the Britons, and to relate only their miſfortunes. 2. Though Nennius was a credulous writer, it is unreaſonable to think that the whole hiſtory of king Arthur was an invention of his. It is more probable that he copied it from other more ancient authors, or took it from the common tradition of his countrymen. That the Saxon annals make no mention of this king is not to be wondered at, ſeeing it is natural to think that they would wiſh to conceal the many defeats he gave their nation. 3. The moſt convincing proof of the exiſtence of king Arthur is, that his tomb was diſcovered at Glaſtenbury in Somerſetſhire, and his coffin dug up, in the reign of Henry II. with the following inſcription upon it in Gothic characters: "Hic jacet ſepultus inclytus rex Arturius in inſula Avalonia." We are told that on his body were plainly to be ſeen the marks of 10 wounds, only one of which ſeemed to be mortal.

40 His exploits.

This renowned prince is ſaid to have defeated the Saxons under Cerdic in 12 pitched battles. The laſt of theſe was fought on Badon-hill, ſuppoſed to be *Banſdown* near Bath; in which the Saxons received ſuch a terrible overthrow, that for many years they gave the Britons no further moleſtation. As new ſupplies of Saxons, however, were continually flocking over, a third and fourth kingdom of them were ſoon formed. The third kingdom comprehended the counties of Devon, Dorſet, Somerſet, Wiltſhire, Hampſhire, and Berkſhire; to which was afterwards added Cornwal. This was called the *kingdom of the Weſt Saxons*. The other kingdom, which was called the *kingdom of the Eaſt Saxons*, comprehended Eſſex, Middleſex, and part of Hertfordſhire.

41 Five other Saxon kingdoms erected.

In the year 542, happened the death of the great king Arthur, ſaid to have been killed in battle with a treacherous kinſman of his own. Five years afterwards, was erected the Saxon kingdom of Northumberland. It extended, however, much farther than the preſent bounds of that county; for it comprehended all Yorkſhire, Lancaſhire, Durham, Cumberland, Weſtmoreland, and Northumberland, with part of Scotland, as far as the Frith of Forth.---Between theſe Saxon kings, frequent contentions now aroſe; by which means the Britons enjoyed an uninterrupted tranquillity for at leaſt 44 years.—This interval, however, according to Gildas, they employed only in corrupting their manners more and more, till at laſt they were rouſed from their ſecurity by the ſetting up of a ſixth Saxon kingdom, called the kingdom of the *Eaſt Angles*. It was founded in 575, and comprehended the counties of Norfolk, Suffolk, Cambridgeſhire, and the Iſle of Ely. The Saxons once more attacked the Britons, and overthrew them in many battles. The war was continued for ten years; after which, another Saxon kingdom called *Mercia* was ſet up. It comprehended 17 counties; *viz.* Gloceſter, Hereford, Worceſter, Warwick, Leiceſter, Rutland, Northampton, Lincoln, Huntington, Bedford, Buckingham, Oxford, Stafford, Nottingham, Derby, Shropſhire, Cheſhire, and part of Hertfordſhire.

42 The Britons defeat the Saxons, but are obliged to retire into Wales.

The provincial Britons were now confined within very narrow bounds. However, before they entirely gave up the beſt part of their country to their enemies, they once more reſolved to try the event of a battle. At this time they were aſſiſted by the Angles, who were jealous of the overgrown power of the Weſt Saxons. The battle was fought in Wiltſhire, at *Woden's Bearth*, a place near the ditch called *Wanſdike*, or *Wodenſdike*; which runs through the middle of the county. The battle was very obſtinate and bloody; but at laſt the Saxons were entirely defeated, and almoſt their whole army cut off. The victory, however, proved of little ſervice to the Britons: for, being greatly inferior in number to the Saxons, and harraſſed by them on the one ſide, and by the Scots and Picts on the other, they were daily more and more confined; and at laſt obliged to take refuge among the craggy and mountainous places in the weſt of the iſland, where their enemies could not purſue them. At firſt they poſſeſſed all the country beyond the rivers Dee and Severn, which anciently divided Cambria, or Wales, from England; the towns which ſtand on the eaſtern banks of theſe rivers having moſtly been built in order to reſtrain the incurſions of the Welſh. But the Engliſh, having paſſed the Severn, by degrees ſeized on the country lying between that river and the Wye. Nay, in former times, ſome parts of Flintſhire and Denbighſhire were ſubject to the kings of Mercia: for Uffa, the moſt powerful king of that country, cauſed a deep ditch to be drawn, and an high wall built, as a barrier between his dominions and the territories of the Welſh, from the mouth of the Dee, a little above Flint-caſtle, to the mouth of the Wye. This ditch is ſtill to be ſeen in ſeveral places; and is called by the Welſh *Claudh Uffa*, or the Ditch of Uffa. The inhabitants of the towns on the eaſt ſide of this ditch are called by the ſame people *Guyry Mers*; that is, the men of Mercia.

43 Account of the heptarchy.

Thus, after a violent conteſt of near 150 years, the Saxons entirely ſubdued the Britons whom they had come to defend, and had erected ſeven independent kingdoms in England, now commonly denominated the *Saxon Heptarchy*. By theſe conquerors the country was now reduced to a degree of barbarity almoſt as great as it had been in when firſt invaded by the Romans. The provincial Britons, during their ſubjection to that people, had made conſiderable advances in civilization. They had built 28 conſiderable cities, beſides a number of villages and country-ſeats; but now theſe were all levelled with the ground, the native inhabitants who remained in England were reduced to the moſt abject ſlavery, and every art and ſcience totally extinguiſhed among them.

Before theſe fierce conquerors could be civilized in any degree, it was neceſſary that all the ſeven kingdoms ſhould be reduced under one head; for as long as they remained independent, their continual wars with each other ſtill kept them in the ſame ſtate of barbarity and ignorance.

The hiſtory of theſe ſeven kingdoms affords no event that can be in the leaſt intereſting. It conſiſts only of a detail of their quarrels for the ſovereignty. This was at laſt obtained by Egbert king of the Weſt Saxons, or Weſſex, in 827. Before this time, Chriſtianity had been introduced into almoſt all the kingdoms of the heptarchy; and however much corrupted it might be by coming through the impure channel of the church of Rome, and miſunderſtood thro' the ignorance of thoſe who received it, it had conſiderably ſoftened the barbarous manners of the Saxons. It had alſo opened a communication between Britain and the more polite parts of Europe, ſo that there was now ſome hope of the introduction of arts and ſciences into this country. Another effect was, that, by the ridiculous notions of preſerving inviolable chaſtity even between married people, the royal families of moſt of the kingdoms were totally extinct; and the people, being in a ſtate of anarchy, were ready to ſubmit to the firſt who aſſumed any authority over them.

All theſe things contributed to the ſucceſs of Egbert in uniting the heptarchy under his own dominion. He was of the royal family of Weſſex; and a nearer heir than Brithric, who had been raiſed to the kingdom in 784. As Egbert was a prince of great accompliſhments, Brithric, knowing that he had a better title to the crown than himſelf, began to look upon him with a very jealous eye. Young Egbert, ſenſible of his danger, privately withdrew to France; where he was well received by Charlemagne, the reigning monarch. The French were reckoned at this period the moſt valiant and polite people in Europe; ſo that this exile proved of great ſervice to Egbert.

He continued at the court of France till he was recalled by the nobility to take poſſeſſion of the kingdom of Weſſex. This recall was occaſioned by the following accident. Brithric the king of Weſſex had married Eadburga, natural daughter of Offa king of Mercia; a woman infamous for cruelty and incontinence. Having great influence over her huſband, ſhe often perſuaded him to deſtroy ſuch of the nobility as were obnoxious to her; and where this expedient failed, ſhe herſelf had not ſcrupled to become their executioner. She had mixed a cup of poiſon for a young nobleman, who had acquired a great ſhare of her huſband's friendſhip: but, unfortunately, the king drank of the fatal potion along with his favourite, and ſoon after expired. By this, and other crimes, Eadburga became ſo odious to the people, that ſhe was forced to fly into France, whence Egbert was at the ſame time recalled, as abovementioned.

Egbert aſcended the throne of Weſſex in the year 799. He was the ſole deſcendent of thoſe conquerors who firſt invaded Britain, and who derived their pedigree from the god Woden. But, though this circumſtance might have given him great advantages in attempting to ſubdue the neighbouring kingdoms, Egbert for ſome time gave them no diſturbance; but turned his arms againſt the Britons, who had retired into Cornwall, whom he defeated in ſeveral battles. He was recalled from his conqueſts in that country, by hearing that Bernulf king of Mercia had invaded his dominions. Egbert quickly led his army againſt the invaders, whom he totally defeated at Ellendun in Wiltſhire. He then entered their kingdom on the ſide of Oxfordſhire with an army, and at the ſame time ſent his eldeſt ſon Ethelwolf with another into Kent. The young prince expelled Baldred the tributary king of Kent, and ſoon made himſelf maſter of the country. The kingdom of Eſſex was conquered with equal eaſe; and the Eaſt Angles, who had been reduced under ſubjection by the Mercians, joyfully put themſelves under the protection of Egbert. Bernulf himſelf marched againſt them, but was defeated and killed; and Ludecan his ſucceſſor met with the ſame fate two years after.

Theſe misfortunes greatly facilitated the reduction of Mercia. Egbert ſoon penetrated into the very heart of the Mercian territories, and gained an eaſy victory over a diſpirited and divided people; but in order to engage them to ſubmit with the leſs reluctance, he allowed Wiglef, their countryman, to retain the title of *king*, whilſt he himſelf exerciſed the real power of a ſovereign. Northumberland was at preſent in a ſtate of anarchy; and this tempted Egbert to carry his victorious arms into that kingdom alſo. The inhabitants, being deſirous of living under a ſettled form of government, readily ſubmitted, and owned him for their ſovereign. To them, however, he likewiſe allowed the power of electing a king; who paid him a tribute, and was dependent on him.

44 Egbert the firſt king of England.

Egbert became ſole maſter of England about the year 827. A favourite opportunity was now offered to the Anglo-Saxons of becoming a civilized people, as they were at peace among themſelves, and ſeemed free from any danger of a foreign invaſion. But this flattering proſpect was ſoon overcaſt. Five years after Egbert had eſtabliſhed his new monarchy, the Danes landed in the iſle of Shepey, plundered it, and then made their eſcape with ſafety. Encouraged by this ſucceſs, next year they landed from a fleet of 35 ſhips. They were encountered by Egbert at Charmouth in Dorſetſhire. The battle was obſtinate and bloody. Great numbers of the Danes were killed, but the reſt made good their retreat to their ſhips. They next entered into an alliance with the Britons of Cornwall; and landing two years after in that country, they made an irruption into Devonſhire. Egbert met them at Hengeſdown, and totally defeated them; but before he had time to form any regular plan for the defence of the kingdom, he died, and left the government to his ſon Ethelwolf.

45 Daniſh invaſion.

46 Ethelwolf.

The new king was weak and ſuperſtitious. He began with dividing the kingdom, which had ſo lately been united, with his ſon Athelſtan. To the young prince he gave the counties of Eſſex, Kent, and Suſſex. But though this diviſion might have been productive of bad conſequences at another time, the fear of the Danes kept every thing quiet for the preſent. Theſe barbarians had ſome how or other conceived ſuch hopes of enriching themſelves by the plunder of England, that they ſcarce ever failed of paying it an annual viſit. The Engliſh hiſtorians tell us, that they met with many ſevere repulſes and defeats; but on the whole it appears, that they had gained ground. For in 851 a body of them took up their winter-quarters in England. Next year they received a ſtrong reinforcement of their countrymen in 350 veſſels; and advancing from the iſle of Thanet, where they had ſtationed themſelves, they burnt the cities of London and Canterbury. Having next put to flight Brichtric the governor of Mercia, they marched into the heart of Surrey, laying waſte the whole country thro' which they paſſed.

Ethelwolf, though naturally little fitted for military enterpriſes, was now obliged to take the field.

He marched againſt the Danes at the head of the Weſt Saxons, and gained an indeciſive and bloody victory over his enemies. The Danes ſtill maintained their ſettlement in the iſle of Thanet. They were attacked by Ealher and Huda, governors of Kent and Surrey; both of whom they defeated and killed. Afterwards they removed to the iſle of Shepey, where they took up their winter-quarters, with a deſign to extend their ravages the next year.

The deplorable ſtate of the kingdom did not hinder Ethelwolf from making a pilgrimage to Rome, whither he carried his fourth and favourite ſon Alfred, then only ſix years of age. He paſſed a twelvemonth in that city; made preſents to the principal eccleſiaſtics there; and made a grant of 300 mancuſes (a ſilver coin about the weight of our half-crown) annually to the ſee of Rome. One third of this was to ſupport the lamps of St Peter's, another thoſe of St Paul's, and the third was for the Pope himſelf. In his return to England, Ethelwolf married Judith, daughter of the emperor Charles the Bald; but when he landed, he found himſelf deprived of his kingdom by his ſon Ethelbald. That prince aſſumed the government of Athelſtan's dominions, who was lately dead; and, with many of Ethelwolf's nobles, formed a deſign of excluding him from the throne altogether, on account of his weakneſſes and ſuperſtitions. Ethelwolf, however, delivered the people from the calamities of a civil war, by dividing the kingdom with his ſon. He gave to Ethelbald the government of the weſtern, and reſerved to himſelf that of the eaſtern part of the kingdom. Immediately after this, he ſummoned the ſtates of the whole kingdom, and conferred on the clergy a perpetual donation of tythes, for which they had long contended, and which had been the ſubject of their ſermons for ſeveral centuries.

This conceſſion was deemed ſo meritorious by the Engliſh, that they now thought themſelves ſure of the favour of heaven; and therefore neglected to uſe the natural means for their ſafety which they might have done. They even agreed, that, notwithſtanding the deſperate ſituation of affairs at preſent, the revenues of the church ſhould be exempted from all burdens, tho' impoſed for the immediate ſecurity and defence of the nation. Ethelwolf died two years after he had made the above-mentioned grant, and left the kingdom to his two eldeſt ſons Ethelbald and Ethelbert. Both theſe princes died in a few years, and left the kingdom to Ethered their brother, in the year 866.

47
Ethered.

The whole courſe of Ethered's reign was diſturbed by the irruptions of the Danes. The king defended himſelf againſt them with great bravery, being ſeconded in all his military enterprizes by his younger brother Alfred, who afterwards aſcended the throne. In this reign, the Danes firſt landed among the Eaſt Angles. That people treacherouſly entered into an alliance with the common enemy; and furniſhed them with horſes, which enabled them to make an irruption into Northumberland. There they ſeized upon the city of York. Oſbricht and Ælla, two Northumbrian princes who attempted to reſcue the city, were defeated and killed. Encouraged by this ſucceſs, the Danes penetrated into the kingdom of Mercia, took up their winter-quarters at Nottingham, and thus threatened the kingdom with a final ſubjection. From this poſt, however, they were diſlodged by Ethered and Alfred, who forced them to retire into Northumberland. Their reſtleſs and ſavage diſpoſition, however, did not ſuffer them to continue long in one place. They broke into Eaſt Anglia; defeated and took priſoner Edmund the tributary king of that country, whom they afterwards murdered; and committed every where the moſt barbarous ravages. In 871, they advanced to Reading; from whence they infeſted the neighbouring country by their incurſions. The Mercians, deſirous of recovering their independency, refuſed to join Ethered with their forces; ſo that he was obliged to march againſt the Danes, attended only by the Weſt Saxons, who were his hereditary ſubjects. Several actions enſued, in which the Danes are ſaid to have been unſucceſsful; but being continually reinforced from their own country, they became every day more and more formidable to the Engliſh. During the confuſion and diſtreſs in which the nation was now neceſſarily involved, king Ethered died of a wound he had received in an action with the Danes; and left to his brother Alfred the kingdom almoſt totally ſubdued by a foreign power.

48
Alfred the Great.

Alfred, who may properly be called the founder of the Engliſh monarchy, aſcended the throne in the year 871, being then only 22 years of age. His great virtues and ſhining talents ſaved his country from ruin, which ſeemed almoſt unavoidable. His exploits againſt the Danes, his dangers and diſtreſſes, are related under the article ALFRED. Having ſettled the nation in a much better manner than could have been expected, he died in 901, leaving the kingdom to his ſecond ſon Edward the Elder.

49
Edward the elder.

The beginning of this monarch's reign was diſturbed by thoſe inteſtine commotions from which the wiſe and politic Alfred had taken ſo much pains to free the nation. Ethelwald, ſon to king Ethelbert, Alfred's elder brother, claimed a right to the throne. Having armed his partiſans, he took poſſeſſion of Winburne, where he ſeemed determined to hold out to the laſt extremity. On the approach of Edward, however, with a powerful army, he firſt fled into Normandy, and afterwards into Northumberland. He hoped to find the Northumbrians ready to join him, as moſt of them were Danes, lately ſubdued by Alfred, and very impatient of peace. The event did not diſappoint his expectations. The Northumbrians declared for him; and Ethelwald having thus connected himſelf with the Daniſh tribes, went beyond ſea, whence he returned with a great body of theſe banditti. On his return, he was joined by the Danes of Eaſt Anglia and Mercia. Ethelwald, at the head of the rebels, made an irruption into the counties of Glouceſter, Oxford, and Wilts; and having ravaged the country, retired with his booty before the king could approach him. Edward, however, took care to revenge himſelf, by conducting his forces into Eaſt Anglia, and ravaging it in like manner. He then gave orders to retire; but the Kentiſh men, greedy of more plunder, ſtaid behind, and took up their quarters at Bury. Here they were aſſaulted by the Danes; but the Kentiſhmen made ſuch an obſtinate defence, that though their enemies gained the victory, it was bought by the loſs of their braveſt men, and, among the reſt, of the uſurper Ethelwald himſelf.

The king, now freed from the attempts of ſo dangerous a rival, concluded an advantageous peace with the Eaſt Angles. He next ſet about reducing the Northumbrians; and for this purpoſe equipped a fleet, hoping that thus they would be induced to remain at home to defend their own country, without attempting to invade his territories. He was diſappointed in his expectations. The Northumbrians were more eager to plunder their neighbours than to ſecure themſelves. Imagining that the whole of Edward's forces were embarked on board his fleet, they entered his territories with all the troops they could raiſe. The king, however, was better prepared for them than they had expected. He attacked them on their return at Tetenhall in the county of Stafford, put them to flight, recovered all the booty, and purſued them with great ſlaughter into their own country.

The reſt of Edward's reign was a ſcene of continued and ſucceſsful action againſt the Northumbrians, Eaſt Angles, the Danes of Mercia, and thoſe which came from their native country in order to invade England. He put his kingdom in a good poſture of defence, by fortifying the towns of Cheſter, Eddeſbury, Warwic, Cherbury, Buckingham, Towceſter, Maldon, Huntingdon, and Colcheſter. He vanquiſhed Thurketill a Daniſh chieftain, and obliged him to retire with his followers into France. He ſubdued the Eaſt Anglians, Northumbrians, and ſeveral tribes of the Britons; and even obliged the Scots to make ſubmiſſions. He died in 925, and was ſucceeded by Athelſtan his natural ſon.

50
Athelſtan.

This prince, notwithſtanding his illegitimate birth, aſcended the throne without much oppoſition, as the legitimate children of Edward were too young to rule a nation ſo much liable both to foreign invaſions and domeſtic troubles as England at preſent was. One Alfred, however, a nobleman of conſiderable power, entered into a conſpiracy againſt him. It is ſaid, that this nobleman was ſeized upon ſtrong ſuſpicions, but without any certain proof. He offered to ſwear to his innocence before the pope; and in thoſe ages it was ſuppoſed that none could take a falſe oath in preſence of ſuch a ſacred perſon, without being viſited by an immediate judgment from God. Alfred was accordingly conducted to Rome, and took the oath required of him before Pope John. The words were no ſooner pronounced, than he fell into convulſions, of which he expired in three days. The king, fully convinced of his guilt, confiſcated his eſtate, and made a preſent of it to the monaſtery of Malmeſbury.

This accident proved the means of eſtabliſhing the authority of Athelſtan in England. But, finding the Northumbrians bore the Engliſh yoke with impatience, he gave Sithric, a Daniſh nobleman, the title of king of Northumberland; and in order to ſecure his friendſhip, gave him his own ſiſter Editha in marriage. This was productive of bad conſequences. Sithric died the year after his marriage with Editha; upon which Anlaf and Godfrid, Sithric's ſons by a former marriage, aſſumed the ſovereignty without waiting for Athelſtan's conſent. They were, however, ſoon obliged to yield to the ſuperior power of that monarch. The former fled to Ireland; and the latter to Scotland, where he was protected by Conſtantine king of that country. The Scottiſh monarch was continually importuned by Athelſtan to deliver up his gueſt, and even threatened with an invaſion in caſe he did not comply. Conſtantine, deteſting this treachery, adviſed Godfrid to make his eſcape. He did ſo, turned pirate, and died ſoon after. Athelſtan, however, reſenting this conduct of Conſtantine, invaded his kingdom, and reduced him, it is ſaid, ſo low, that he was obliged to make the moſt humble ſubmiſſions. This, however, is denied by all the Scottiſh hiſtorians.

51
Defeats his enemies.

Conſtantine, after the departure of Athelſtan, entered into a confederacy with Anlaf, who ſubſiſted by his piracies, and with ſome of the Welſh princes who were alarmed at the increaſe of Athelſtan's power. All theſe confederates made an irruption into England at once; but Athelſtan meeting them at Brumſbury in Northumberland, gave them a total overthrow. Anlaf and Conſtantine made their eſcape with difficulty, leaving the greateſt part of their men dead on the field of battle. After this period, Athelſtan enjoyed his crown in tranquillity. He died in 941, after a reign of 16 years. He paſſed a remarkable law, for the encouragement of commerce; *viz.* that a merchant, who had made three long ſea-voyages on his own account, ſhould be admitted to the rank of a thane or gentleman.

52
Edmund.

Athelſtan was ſucceeded by his brother Edmund. On his acceſſion, he found the kingdom diſturbed by the reſtleſs Northumbrians, who watched for every opportunity of riſing in rebellion. They were, however, ſoon reduced; and Edmund took care to enſure the peace of the kingdom, by removing the Danes from the towns of Mercia where they had been allowed to ſettle, becauſe it was found that they took every opportunity to introduce foreign Danes into the kingdom. He alſo conquered Cumberland from the Britons. This county, however, he beſtowed upon Malcolm king of Scotland, upon condition that he ſhould do homage for it, and protect the north of England from all future incurſions of the Danes.

53
Murdered by Leolf.

Edmund was unfortunately murdered in Gloceſter, by one Leolf a notorious robber. This man had been formerly ſentenced to baniſhment; yet had the boldneſs to enter the hall where the king himſelf dined, and to ſit at table with his attendants. Edmund immediately ordered him to leave the room. The villain refuſed to obey; upon which the king leaped upon him, and ſeized him by the hair. Leolf then drew a dagger, and gave the king a wound, of which he inſtantly died, A. D. 946, being the ſixth year of his reign.

54
Edred.

55
Subdues the Northumbrians.

As the children of Edmund were too young at the time of his deceaſe, his brother Edred ſucceeded to the throne. The beginning of his reign, as well as thoſe of his predeceſſors, was diſturbed by the rebellions and incurſions of the Northumbrian Danes, who looked upon the ſucceſſion of every new king to be a favourable opportunity for ſhaking off the Engliſh yoke. On the appearance of Edred with an army, however, they immediately ſubmitted; but before the king withdrew his forces, he laid waſte their territories as a puniſhment for their offence. He was no ſooner gone, than they roſe in rebellion a ſecond time. They were again ſubdued; and the king took effectual precautions againſt their future revolts, by placing Engliſh garriſons in all their towns, and appointing an Engliſh governor to watch their motions, and ſuppreſs their in-

56 Celibacy of the clergy introduced.

ſurrections on the firſt appearance.—In the reign of Edred, celibacy of the clergy began to be preached up under the patronage of St Dunſtan. This man had obtained ſuch an aſcendant over Edred, who was naturally ſuperſtitious, that he not only directed him in affairs of conſcience, but in the moſt important matters of ſtate. He was placed at the head of the treaſury; and being thus poſſeſſed of great power at court, he was enabled to accompliſh the moſt arduous undertakings. He profeſſed himſelf a partiſan of the rigid monaſtic rules; and having introduced celibacy among the monks of Glaſtenbury and Abingdon, he endeavoured to render it univerſal among the clergy throughout the kingdom. The monks in a ſhort time generally embraced the pretended reformation; after which they inveighed bitterly againſt the vices and luxury of the age. When other topics of defamation were wanting, the marriages of clergymen became a ſure object of invective. Their wives received the appellation of *concubines*, or ſome other more opprobrious name. The ſecular clergy, on the other hand, who were numerous and rich, defended themſelves with vigour, and endeavoured to retaliate upon their adverſaries. The people were thrown into the moſt violent ferments; but the monks, being patroniſed by king Edred, gained ground greatly upon their opponents. Their progreſs, however, was ſomewhat retarded by the king's death, which happened in 955, after a reign of nine years. He left children; but as they were infants, his nephew Edwy, ſon to Edmund, was placed on the throne.

57 Edwy.

The new king was not above 16 or 17 years of age at the time of his acceſſion. His reign is only remarkable for the tragical ſtory of his queen Elgiva. She was a princeſs of the royal blood, with whom Edwy was deeply enamoured. She was his ſecond or third couſin, and therefore within the degrees of affinity prohibited by the canon law. Edwy, however, hearkening only to the dictates of his paſſion, married her, contrary to the advice of the more dignified eccleſiaſtics. The monks on this occaſion were particularly violent; and therefore Edwy determined not to ſecond their ambitious projects. He ſoon found reaſon to repent his having provoked ſuch dangerous enemies. On his coronation day, while his nobility were indulging themſelves in riotous mirth in a great hall where they had aſſembled, Edwy withdrew to another apartment to enjoy the company of his beloved queen and her mother. Dunſtan gueſſed the reaſon of his abſence. With unparalleled impudence, he burſt into the queen's apartment; and upbraiding Edwy with his laſciviouſneſs, as he termed it, puſhed him back to the hall where the nobles were aſſembled. The king determined to reſent ſuch a daring inſult. He required from Dunſtan an account of his adminiſtration of the treaſury during the late reign. The monk, probably unable to give a juſt account, refuſed to give any; upon which Edwy accuſed him of malverſation in his office, and baniſhed him the kingdom.

58 Tragical death of the queen.

This proved the worſt ſtep that could poſſibly have been taken. Dunſtan was no ſooner gone, than the whole nation was in an uproar about his ſanctity and the king's impiety. Theſe clamours, as they had been begun by the clergy, ſo they were kept up and increaſed by them, till at laſt they proceeded to the moſt outrageous violence. Archbiſhop Odo ſent a party of ſoldiers to the palace. They ſeized the queen, and burned her face with a red-hot iron, in order to deſtroy her beauty by which ſhe had enticed her huſband; after which they carried her by force into Ireland, there to remain in perpetual exile. The king, finding it in vain to reſiſt, was obliged to conſent to a divorce from her, which was pronounced by Archbiſhop Odo. A cataſtrophe ſtill more diſmal awaited Elgiva. She had been cured of her wounds, and had even found means to efface the ſcars with which her perſecutors had hoped to deſtroy her beauty. She then came to England, with a deſign to return to the king, whom ſhe ſtill conſidered as her huſband. Unfortunately, however, ſhe was intercepted by a party of ſoldiers ſent for that purpoſe by the primate. Nothing but her moſt cruel death could now ſatisfy that wretch and his accomplices. She was hamſtringed at Glouceſter, and expired in a few days.

The minds of the Engliſh were at this time ſo much ſunk in ſuperſtition, that the monſtrous inhumanity above-mentioned was called a judgment from God upon Edwy and his ſpouſe for their diſſolute life, *i. e.* their love to each other. They even proceeded to rebellion againſt their ſovereign; and having raiſed to the throne Edgar, the younger brother of Edwy, at that time only 13 years of age, they ſoon put him in poſſeſſion of Mercia, Northumberland, and Eaſt Anglia. Edwy being thus confined to the ſouthern counties, Dunſtan returned, and took upon him the government of Edgar and his party; but the death of Edwy ſoon removed all difficulties, and gave Edgar peaceable poſſeſſion of the government.

59 Edgar.

The reign of Edgar proved one of the moſt fortunate mentioned in the ancient Engliſh hiſtory. He took the moſt effectual methods both for preventing tumults at home, and invaſions from abroad. He quartered a body of diſciplined troops in the north, in order to repel the incurſions of the Scots, and to keep the Northumbrians in awe. He built a powerful navy; and that he might keep the ſeamen in the practice of their duty, as well as preſent a formidable armament to his enemies, he commanded the fleet, from time to time, to make the circuit of his dominions.

60 His licentious amours.

The greatneſs of king Edgar, which is very much celebrated by the Engliſh hiſtorians, was owing to the harmony which reigned between him and his ſubjects; and the reaſon of this good agreement was, that the king ſided with Dunſtan and the monks, who had acquired a great aſcendant over the people. He enabled them to accompliſh their favourite ſcheme of diſpoſſeſſing the ſecular canons of all the monaſteries; and he conſulted them not only in eccleſiaſtical, but alſo in civil affairs.—On theſe accounts, he is celebrated by the monkiſh writers with the higheſt praiſes; though it is plain, from ſome of his actions, that he was a man who could be bound neither by the ties of religion nor humanity. He broke into a convent, and carried off by force, and raviſhed, a nun called *Editha*. His ſpiritual inſtructor, Dunſtan, for this offence, obliged the king, not to ſeparate from his miſtreſs, but to abſtain from wearing his crown for ſeven years!

Edgar, however, was not to be ſatisfied with one miſtreſs. He happened once to lodge at the houſe of a nobleman who had a very beautiful daughter. Edgar,

gar, enflamed with deſire at the ſight of the young lady, without ceremony aſked her mother to allow her to paſs a night with him. She promiſed compliance; but ſecretly ordered a waiting-maid, named *Elfleda*, to ſteal into the king's bed when the company were gone, and to retire before day-break. Edgar, however, detained her by force, till day-light diſcovered the deceit. His love was now transferred to the waiting-maid; who became his favourite miſtreſs, and maintained a great aſcendant over him till his marriage with Elfrida.

61
His marriage with Elfrida.

The circumſtances of this marriage were ſtill more ſingular and criminal than thoſe abovementioned. Elfrida was daughter and heireſs to Olgar earl of Devonſhire. She was a perſon of ſuch exquiſite beauty, that her fame was ſpread all over England, though ſhe had never been at court. Edgar's curioſity was excited by the accounts he had heard of her, and therefore formed a deſign of marrying her. He communicated his intention to earl Athelwold his favourite; and ordered him, on ſome pretence or other, to viſit the earl of Devonſhire, and bring him a certain account concerning Elfrida. Athelwold went as he was deſired; but fell ſo deeply in love with the lady himſelf, that he reſolved to ſacrifice his fidelity to his paſſion. He returned to Edgar, and told him, that Elfrida's charms were by no means extraordinary, and would have been totally overlooked in a woman of inferior ſtation. After ſome time, however, turning the converſation again upon Elfrida, he told the king that he thought her parentage and fortune made her a very advantageous match; and therefore, if the king gave his conſent, he would make propoſals to the earl of Devonſhire on his own behalf. Edgar conſented, and Athelwold was married to Elfrida.—After his marriage, he uſed his utmoſt endeavours to keep his wife from court, that Edgar might have no opportunity of obſerving her beauty. The king, however, was ſoon informed of the truth; and told Athelwold that he intended to pay him a viſit in his caſtle, and be made acquainted with his new-married wife. The earl could make no objections; only he deſired a few hours to prepare for the viſit. He then confeſſed the whole to Elfrida, and begged of her to appear before the king as much to the diſadvantage as poſſible. Inſtead of this, ſhe dreſſed herſelf to the greateſt advantage. Edgar immediately conceived a violent paſſion for her; and, in order to gratify it, ſeduced Athelwold into a wood under pretence of hunting, where he ſtabbed him with his own hand, and afterwards married his widow.

The reign of Edgar is remarkable among hiſtorians for the encouragement he gave to foreigners to reſide at his court and throughout the kingdom. Theſe foreigners, it is ſaid, corrupted the former ſimple manners of the nation. Of this ſimplicity, however, there ſeems to be no great reaſon to boaſt; ſeeing it could not preſerve them from treachery and cruelty, the greateſt of all vices: ſo that their acquaintance with foreigners was certainly an advantage to the people, as it tended to enlarge their views, and cure them of thoſe illiberal prejudices and ruſtic manners to which iſlanders are often ſubject.—Another remarkable incident, is the extirpation of wolves from England. The king took great pleaſure in hunting and deſtroying theſe animals himſelf. At laſt he found that they had all taken ſhelter in the mountains and foreſts of Wales. Upon this he changed the tribute impoſed upon the Welſh princes by Athelſtan, into an annual tribute of 300 wolves heads; and this produced ſuch diligence in hunting them, that the animal has never ſince appeared in England.

62
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63
Edward the Martyr.

Edgar died in 957, after a reign of 16 years. He left a ſon named *Edward*, whom he had by his firſt wife the daughter of earl Ordmer; and another, named *Ethelred*, by Elfrida. The mental qualifications of this lady were by no means anſwerable to the beauty of her perſon. She was ambitious, haughty, treacherous, and cruel. The principal nobility, therefore, were greatly averſe from the ſucceſſion of her ſon Ethelred, which would unavoidably throw too much power into the hands of his mother, as he himſelf was only ſeven years of age. Edward, afterwards ſurnamed the *Martyr*, was therefore pitched upon; and was certainly the moſt proper perſon, as he was 15 years of age, and might ſoon be able to take the government into his own hands. Elfrida oppoſed his advancement with all her might: but Dunſtan overcame every obſtacle, by anointing and crowning the young prince at Kingſton; upon which the whole kingdom ſubmitted without farther oppoſition.

The only remarkable occurrence in this reign was the complete victory gained by the monks over the ſecular clergy, who were now totally expelled from the convents. Tho' this had been pretty nearly accompliſhed by Edgar, the ſecular clergy ſtill had partiſans in England who made conſiderable oppoſition; but theſe were all ſilenced by the following miracles. In one ſynod, Dunſtan, finding the majority of votes againſt him, roſe up, and declared that he had that inſtant received from heaven a revelation in favour of the monks. The whole aſſembly was ſo much overawed by this intelligence, that they proceeded no farther in their deliberations. In another ſynod, a voice iſſued from the crucifix, acquainting the members, that the eſtabliſhment of the monks was founded on the will of heaven, and could not be oppoſed without impiety. But the third miracle was ſtill more alarming. In another ſynod the floor of the hall ſunk, and great numbers of the members were killed or bruiſed by their fall. It was remarked that Dunſtan had that day prevented the king from attending the ſynod, and that the beam on which his own chair ſtood was the only one which did not ſink. Theſe circumſtances, inſtead of making him ſuſpected as the author of the miracle, were regarded as proofs of the interpoſition of Providence in his favour.

64
Miracles of St Dunſtan.

Edward lived four years after he was raiſed to the throne, in perfect innocence and ſimplicity. Being incapable of any treacherous intention himſelf, he ſuſpected none in others. Though his ſtepmother had oppoſed his ſucceſſion, he had always behaved towards her with the greateſt reſpect; and expreſſed on all occaſions the moſt tender affection for his brother Ethelred. Being one day hunting in the neighbourhood of the caſtle where Elfrida reſided, he paid her a viſit unattended by any of his retinue. After mounting his horſe with a deſign to return, he deſired ſome liquor to be brought him. But while he was holding the cup to his head, a ſervant of Elfrida ſtabbed him behind. The king, finding himſelf wounded, clapped ſpurs to his

65
The king murdered.

his horſe; but ſoon becoming faint by the loſs of blood, he fell from the ſaddle, and his foot being entangled in the ſtirrup, he was dragged along till he expired. His body was found and privately interred at Wereham by his ſervants. The Engliſh had ſuch compaſſion for this amiable prince, that they beſtowed on him the appellation of *Martyr*, and even fancied that miracles were wrought at his tomb. Elfrida built monaſteries, and ſubmitted to many penances, in order to atone for her guilt; but, even in that barbarous age, ſhe could never regain the good opinion of the public.

66
Ethelred.

After the murder of Edward, his brother Ethelred ſucceeded to the throne without oppoſition. As he was a minor when he was raiſed to the throne, and, even when he came to man's eſtate, never diſcovered any vigour or capacity of defending the kingdom againſt invaders, the Danes began to renew their incurſions. Before they durſt attempt any thing of importance, however, they firſt made a ſmall incurſion by way of trial. In the year 981, they landed in Southampton from ſeven veſſels; and having ravaged the country, they retired with impunity, carrying a great booty along with them. In 987, they made a ſimilar attempt on the weſt coaſt, and were attended with the like ſucceſs. Finding that matters were now in a favourable ſituation for their enterpriſes, they landed in Eſſex under the command of two chieftains; and, having defeated and killed Brithnot duke of that county, laid waſte all the neighbouring provinces. In this extremity, Ethelred, ſurnamed, on account of his prepoſterous conduct, the *Unready*, bribed the enemy with L.10,000 to depart the kingdom. This advice was given by Siricius archbiſhop of Canterbury, and ſome of the degenerate nobility; and was attended with the ſucceſs that might have been expected. The Danes appeared next year off the eaſtern coaſt. But, in the mean time, the Engliſh had determined to aſſemble at London a fleet capable of repulſing the enemy. This failed of ſucceſs through the treachery of Alfric duke of Mercia. Having been formerly baniſhed the kingdom, and found great difficulty in getting himſelf reſtored to his former dignity, he truſted thenceforth, not to his ſervices or the affections of his countrymen, but to the influence he had over his vaſſals, and to the public calamities. Theſe laſt he determined always to promote as far as he could; becauſe in every revolution his aſſiſtance would be neceſſary, and conſequently he muſt receive a continual acceſſion of power. The Engliſh had formed a plan for ſurrounding and deſtroying the Daniſh fleet in the harbour; but Alfric not only gave the enemy notice of this deſign, but alſo deſerted with his ſquadron the night before the engagement. The Engliſh by this means proved unſucceſsful, and Ethelred in revenge, took Alfgar, Alfric's ſon, and ordered his eyes to be put out. This piece of cruelty could be productive of no good effect. Alfric had become ſo powerful, that, notwithſtanding his treachery, it was found impoſſible to deprive him of the government of Mercia.

67
England invaded and ruined by the Danes.

In 993, the Danes under the command of Sweyn their king, and the Norwegians conducted by Olave king of that country, ſailed up the Humber, and deſtroyed all around them. A powerful army was aſſembled to oppoſe theſe invaders; but thro' the treachery of the three leaders, all men of Daniſh extraction, the Engliſh were totally defeated. Encouraged by this ſucceſs, the Danes entered the Thames in 94 veſſels, and laid ſiege to London. The inhabitants, however, made ſuch a brave defence, that the beſiegers were finally obliged to give over the attempt. Out of revenge for this diſappointment, they laid waſte Eſſex, Suſſex, and Hampſhire. In theſe counties they procured horſes; by which means they were enabled to penetrate into the more inland parts, and threatened the kingdom with total ſubjection. Ethelred and his nobles had now recourſe to their former expedient. They ſent ambaſſadors to the two northern kings, to whom they promiſed ſubſiſtence and tribute, provided they would, for the preſent, put an end to their ravages, and ſoon after depart the kingdom. They agreed to the terms, and peaceably took up their quarters at Southampton. Olave even paid a viſit to Ethelred, and received the rite of confirmation from the Engliſh biſhops. The king alſo made him many valuable preſents; and Olave promiſed never more to infeſt the Engliſh territories, which promiſe it is ſaid he afterwards religiouſly obſerved.

After the departure of Olave with his Norwegians, Sweyn, though leſs ſcrupulous than the king of Norway, was obliged to leave the kingdom alſo. But this ſhameful compoſition procured only a ſhort relief to the nation. The Danes ſoon after appeared in the Severn; and having ravaged Wales as well as Cornwall and Devon, they ſailed round, and, entering the mouth of the Tamar, completed the ruin of theſe two counties. Then, returning to the Briſtol channel, and penetrating into the country by the Avon, they over-ran all that country, and carried fire and ſword even into Dorſetſhire. In 998, they changed the ſeat of war; and, after ravaging the iſle of Wight, they entered the Thames and Medway, where they laid ſiege to Rocheſter, and defeated the Kentiſh men in a great battle. After this victory, the whole province of Kent was made a ſcene of ſlaughter and devaſtation. The extremity of theſe miſeries forced the Engliſh into counſels for common defence both by ſea and land: but the weakneſs of the king, the diviſions among the nobility, the treachery of ſome, the cowardice of others, the want of concert in all, fruſtrated every endeavour; and their fleets and armies either came too late to attack the enemy, or were repulſed with diſhonour. The Engliſh, therefore, devoid both of prudence and unanimity in council, had recourſe to the expedient which by experience they had found to be ineffectual. They offered the Danes a large ſum if they would conclude a peace and depart the kingdom. Theſe ravagers continually roſe in their demands; and now required the payment of L. 24,000, which the Engliſh ſubmitted to give. The departure of the Danes procured them a temporary relief; which they enjoyed as if it was to be perpetual, without making any effectual preparations for giving them a more vigorous reception upon their next return.

Beſides the receiving this ſum, the Danes were at preſent engaged by another motive to depart from England. They were invited over by their countrymen in Normandy, who at this time were hard preſſed by Robert king of France, and who found it difficult to defend their ſettlements againſt him. It is probable alſo, that Ethelred, obſerving the cloſe connection of

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68 Marriage of the king with the princeſs of Normandy.

all the Danes with one another, however they might be divided in government or ſituation, was deſirous of procuring an alliance with that formidable people. For this purpoſe, being at preſent a widower, he made his addreſſes to Emma, ſiſter to Richard II. duke of Normandy. He ſoon ſucceeded in his negociations; the princeſs came over to England, and was married to the king in the year 1001.

Though the Danes had been for a long time eſtabliſhed in England, and though the ſimilarity of their language with the Saxon had invited them to an early coalition with the natives; they had as yet found ſo little example of civilized manners among the Engliſh, that they retained all their ancient ferocity, and valued themſelves only on their national character of military bravery. The Engliſh princes had been ſo well acquainted with their ſuperiority in this reſpect, that Athelſtan and Edgar had been accuſtomed to keep in pay large bodies of Daniſh troops, who were quartered about the country, and committed many violences upon the inhabitants. Theſe mercenaries had attained to ſuch an height in luxury, according to the old Engliſh writers, that they combed their hair once a-day, bathed themſelves once a-week, changed their clothes frequently; and by all theſe arts of effeminacy, as well as by their military character, had rendered themſelves ſo agreeable to the fair ſex, that they debauched the wives and daughters of the Engliſh, and had diſhonoured many families. But what moſt provoked the inhabitants was, that, inſtead of defending them againſt invaders, they were always ready to betray them to the foreign Danes, and to aſſociate themſelves with every ſtraggling party which came from that nation.

69 Danes maſſacred.

The animoſities between the native Engliſh and the Danes who inhabited among them, had from theſe cauſes riſen to a great height; when Ethelred, from a policy commonly adopted by weak princes, took the cruel reſolution of maſſacring the Danes throughout the kingdom. On the 13th of November 1002, ſecret orders were diſpatched to commence the execution every where on the ſame day; and the feſtival of St Brice, which fell on a Sunday, the day on which the Danes uſually bathed themſelves, was choſen for this purpoſe. Theſe cruel orders were executed with the utmoſt exactneſs. No diſtinction was made betwixt the innocent and the guilty; neither ſex nor age was ſpared; nor were the cruel executioners ſatisfied without the tortures, as well as death, of the unhappy victims. Even Gunilda, ſiſter to the king of Denmark, who had married earl Paling, and had embraced Chriſtianity, was, by the advice of Edric earl of Wilts, ſeized and condemned to death by Ethelred, after ſeeing her huſband aud children butchered before her face. This unhappy princeſs foretold, in the agonies of deſpair, that her murder would ſoon be avenged by the total ruin of the Engliſh nation (A).

70 New invaſion by Sweyn.

The prophecy of Gunilda was exactly fulfilled. In 1003, Sweyn and his Danes, who wanted only a pretence to renew their invaſions, appeared off the weſtern coaſt, and threatened revenge for the ſlaughter of their countrymen. The Engliſh took meaſures for repulſing the enemy: but theſe were defeated through the treachery firſt of Alfric; and then of Edric, a ſtill greater traitor, who had married the king's daughter, and ſucceeded Alfric in the command of the Britiſh armies. The Danes therefore ravaged the whole country. Agriculture was neglected, a famine enſued, and the kingdom was reduced to the utmoſt degree of miſery. At laſt the infamous expedient of buying a peace was recurred to; and the departure of the Danes was purchaſed, in 1007, at the expence of L. 30,000.

The Engliſh endeavoured to employ this interval in making preparations againſt the return of the Danes, which they had reaſon ſoon to expect. A law was made, ordering the proprietors of eight hides of land to provide themſelves of a horſeman and a complete ſuit of armour; and thoſe of 310 hides to equip a ſhip for the defence of the kingdom. By this means a formidable armament was raiſed. There were 243,600 hides in England; conſequently the ſhips equipped muſt be 785. The cavalry was 30,450 men. All hopes of ſucceſs from this equipment, however, were diſappointed by the factions, animoſities, and diſſenſions of the nobility. Edric had cauſed his brother Brightric to advance an accuſation of treaſon againſt Wolfnoth governor of Suſſex, the father of the famous earl Godwin; and that nobleman, knowing the power and malice of his enemy, conſulted his own ſafety by deſerting with 20 ſhips to the Danes. Brightric purſued him with a fleet of 80 ſail; but his ſhips being ſhattered in a tempeſt, and ſtranded on the coaſt, he was ſuddenly attacked by Wolfnoth, and all his veſſels were burnt or otherwiſe deſtroyed. The treachery of Edric fruſtrated every plan of future defence; and the whole navy was at laſt ſcattered into the ſeveral harbours.

By theſe fatal miſcarriages, the enemy had leiſure to over-run the whole kingdom. They had now got ſuch a footing, indeed, that they could hardly have been expelled though the nation had been ever ſo unanimous. But ſo far did mutual diffidence and diſſention prevail, that the governors of one province refuſed to march to the aſſiſtance of another; and were at laſt terrified from aſſembling their forces for the defence of their own. At laſt the uſual expedient was tried. A peace was bought with L. 48,000; but this did not procure even the uſual temporary relief. The Danes, knowing that they were now maſters of the kingdom, took the money, and continued their devaſtations. They levied a new contribution of L. 8000 on the county of Kent alone; murdered the archbiſhop of Canterbury, who had refuſed to countenance this exaction; and the Engliſh nobility ſubmitted every where to the Daniſh

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(A) On the ſubject of this maſſacre, Mr Hume has the following obſervations: "Almoſt all the ancient hiſtorians ſpeak of this maſſacre of the Danes as if it had been univerſal, and as if every individual of that nation throughout England had been put to death. But the Danes were almoſt the ſole inhabitants in the kingdoms of Northumberland and Eaſt Anglia, and were very numerous in Mercia. This repreſenration of the matter was abſolutely impoſſible. Great reſiſtance muſt have been made, and violent wars enſued; which was not the caſe. This account given by Wallingford, though he ſtands ſingle, muſt be admitted as the only true one. We are told that the name of *lurdane*, *lord Dane*, for an idle lazy fellow who lives at other peoples expence, came from the conduct of the Danes who were put to death. But the Engliſh princes had been entirely maſters for ſeveral generations; and only ſupported a military corps of that nation. It ſeems probable, therefore, that theſe Danes only were put to death."

71 Ethelred flies to Normandy.

Daniſh monarch, ſwearing allegiance to him, and giving hoſtages for their good behaviour. At laſt, Ethelred himſelf, dreading equally the violence of the enemy and the treachery of his own ſubjects, fled into Normandy, whither he had already ſent queen Emma and her two ſons Alfred and Edward. The duke received his unhappy gueſts, with a generoſity which does honour to his memory.

72 Returns, but behaves as ill as ever.

The flight of king Ethelred happened in the end of the year 1013. He had not been above ſix weeks in Normandy, when he heard of the death of Sweyn, which happened at Gainſborough before he had time to eſtabliſh himſelf in his new dominions. At the ſame time he received an invitation from the prelates and nobility to reſume the kingdom; expreſſing alſo their hopes, that, being now better taught by experience, he would avoid thoſe errors which had been ſo fatal to himſelf and his people. But the miſconduct of Ethelred was incurable; and, on his reſuming the government, he behaved in the very ſame manner that he had done before. His ſon-in-law Edric, notwithſtanding his repeated treaſons, retained ſuch influence at court, that he inſtilled into the king jealouſies of Sigefert and Morcar, two of the chief nobles of Mercia. Edric enticed them into his houſe, where he murdered them; while Ethelred partook of the infamy of this action, by confiſcating their eſtates, and confining the widow of Sigefert in a convent. She was a woman of ſingular beauty and merit; and in a viſit which was paid her, during her confinement, by prince Edmund the king's eldeſt ſon, ſhe inſpired him with ſo violent an affection, that he releaſed her from the convent, and ſoon after married her without his father's conſent.

In the mean time, Canute, the ſon and ſucceſſor of Sweyn, proved an enemy no leſs terrible to the Engliſh than his father had been. He ravaged the eaſtern coaſt with mercileſs fury; and put aſhore all the Engliſh hoſtages at Sandwich, after having cut off their hands and noſes. He was at laſt obliged, by the neceſſity of his affairs, to return to Denmark. In a ſhort time, however, he returned, and continued his depredations along the ſouthern coaſt. He then broke into the counties of Dorſet, Wilts, and Somerſet; where an army was aſſembled againſt him under the command of prince Edmund and duke Edric. The latter ſtill continued his perfidious machinations; and after endeavouring in vain to get the prince into his power, found means to diſſipate the army, and then deſerted to Canute with 40 veſſels.

Edmund was not diſheartened by this treachery. He again aſſembled his forces, and was in a condition to give the enemy battle. Ethelred, however, had now ſuch frequent experience of the treachery of his ſubjects, that he had loſt all confidence in them. He remained in London, pretending ſickneſs, but in reality from an apprehenſion than they intended to buy their peace by delivering him into the hands of his enemies. The army called aloud for their ſovereign to march at their head againſt the Danes; and on his refuſal to take the field, they were ſo diſcouraged, that all the preparations which had been made became ineffectual for the defence of the kingdom. Edmund, deprived of all regular reſources for the maintenance of the ſoldiers, was obliged to commit ſimilar ravages to thoſe practiſed by the Danes; and after making ſome fruitleſs expeditions into the north, which had ſubmitted entirely to Canute's power, he returned to London, where he found every thing in confuſion by the death of the king.

73 Edmund Ironſide divides the kingdom with the Danes.

Ethelred died in 1016, after an unhappy reign of 35 years; and was ſucceeded by his eldeſt ſon Edmund, ſurnamed *Ironſide* on account of his great ſtrength and valour. He poſſeſſed abilities ſufficient to have ſaved his country from ruin, had he come ſooner to the throne; but it was now too late. He bravely oppoſed the Danes, however, notwithſtanding every diſadvantage; till at laſt the nobility of both nations obliged their kings to come to a compromiſe, and divide the kingdom between them by treaty. Canute reſerved to himſelf Mercia, Eaſt Anglia, and Northumberland, which he had entirely ſubdued. The ſouthern parts were left to Edmund. This prince ſurvived the treaty only about a month; being murdered at Oxford by two of his chamberlains, accomplices of Edric.

74 Canute.

After the death of Edmund, nothing was left for the Engliſh but ſubmiſſion to Canute. The leaſt ſcrupulous of mankind, however, dare not at all times openly commit injuſtice. Canute, therefore, before he ſeized the dominions of Edwin and Edward, the two ſons of Edmund, ſuborned ſome of the nobility to depoſe, that, in the laſt treaty with Edmund, it had been verbally agreed, that, in caſe of Edmund's death, Canute ſhould either be ſucceſſor to his dominions, or tutor to his children; for hiſtorians differ with regard to this particular. This evidence, ſupported by the great power of Canute, was ſufficient to get him elected king of England. Immediately after his acceſſion to the throne, he ſent the two ſons of Edmund to the court of Sweden, on pretence of being there educated; but charged the king to put them to death as ſoon as they arrived. The Swediſh monarch did not comply with this requeſt; but ſent them to Solomon king of Hungary, to be educated in his court. The elder, Edwin, was afterwards married to Solomon's ſiſter: but, he dying without iſſue, that prince gave his ſiſter-in-law, Agatha, daughter of the emperor Henry II. in marriage to Edward, the younger brother; and ſhe bore him Edgar Atheling; Margaret, afterwards queen of Scotland; and Chriſtina, who retired into a convent.

75 Marries Ethelred's widow.

Canute was obliged at firſt to make great conceſſions to the nobility: but he afterwards put to death many of thoſe in whom he could not put confidence; and, among the reſt, the traitor Edric himſelf, who was publicly executed, and his body thrown into the Thames. In order to prevent any danger from the Normans, who had threatened him with an invaſion, he married Emma the widow of Ethelred, and who now came over from Normandy; promiſing that he would leave the children he ſhould have by that marriage, heirs to the crown after his deceaſe. The Engliſh were at firſt diſpleaſed with Emma for marrying the mortal enemy of her former huſband; but at the ſame time were glad to find at court a ſovereign to whom they were accuſtomed, and who had already formed connections with them: and thus Canute, beſides ſecuring by his marriage the alliance with Normandy, gradually acquired by the ſame means the confidence of his own people.

The moſt remarkable tranſaction in this prince's reign, beſides thoſe mentioned under the article CANUTE, is his expedition to Scotland againſt Malcolm king of that country, whom he forced to do homage for the county of Cumberland, which the Scots at that time poſſeſſed. After this enterpriſe, Canute paſſed four years in peace, and died at Shaftſbury; leaving three ſons, Sweyn, Harold, and Hardicanute. Sweyn, whom he had by his firſt marriage with Alfwen, daughter of the earl of Hampſhire, was crowned in Norway: Hardicanute, whom Emma had born, was in poſſeſſion of Denmark; and Harold, who was of the ſame marriage with Sweyn, was at that time in England.

76
Harold.

Harold ſucceeded to the crown of England; though it had been ſtipulated that Emma's ſon, Hardicanute, ſhould be heir to that kingdom. This advantage Harold obtained by being on the ſpot, and getting poſſeſſion of his father's treaſures, while Hardicanute was at a diſtance. As Hardicanute, however, was ſupported by earl Godwin, a civil war was likely to enſue, when a compromiſe was made; by which it was agreed, that Harold ſhould enjoy London, and all the provinces north of the Thames, while the poſſeſſion of the ſouth ſhould remain to Hardicanute: and till that prince ſhould appear and take poſſeſſion of his dominions, Emma fixed her reſidence at Wincheſter, and ruled her ſon's part. Harold reigned four years; during which time, the only memorable action he performed was a moſt infamous piece of treachery.—Alfred and Edward, the two ſons of Emma by Ethelred, paid a viſit to their mother in England. But, in the mean time, earl Godwin being gained over by Harold, a plan was laid for the deſtruction of the two princes. Alfred was accordingly invited to London by Harold, with many profeſſions of friendſhip; but when he had reached Guildford, he was ſet upon by Godwin's vaſſals: about 600 of his train were murdered in the moſt cruel manner; he himſelf was taken priſoner, his eyes were put out, and he was conducted to the monaſtery of Ely, where he died ſoon after. Edward and Emma, appriſed of the fate which awaited them, fled beyond ſea, the former into Normandy, the latter into Flanders; while Harold took poſſeſſion of all his brother's dominions without oppoſition.—He died in April 1039.

77
His treachery and cruelty.

Hardicanute ſucceeded his brother Harold without oppoſition. His government was extremely violent and tyrannical. However, it was but of ſhort duration. He died, in 1041, of a debauch at the marriage of a Daniſh lord. After his death, a favourable opportunity was offered to the Engliſh for ſhaking off the Daniſh yoke. Sweyn, king of Norway, the eldeſt ſon of Canute, was abſent; and as the two laſt kings had died without iſſue, there appeared none of that race whom the Danes could ſupport as ſucceſſor to the throne. For this reaſon, the eyes of the nation were naturally drawn towards prince Edward, who happened to be at court when the king died. There were ſome reaſons, however, to fear, that Edward's ſucceſſion would be oppoſed by earl Godwin, who was by far the moſt powerful nobleman in the kingdom. A declared animoſity ſubſiſted between Edward and Godwin, on account of the hand which the latter had in the murder of his brother Alfred; and this was thought to be an offence of ſo grievous a nature, that Edward could never forgive it. But here their common friends interpoſed; and repreſenting the neceſſity of their good correſpondence, obliged them to lay aſide their animoſities, and to concur in reſtoring liberty to their native country. Godwin only ſtipulated that Edward, as a pledge of his ſincere reconciliation, ſhould promiſe to marry his daughter Editha. This propoſal was agreed to; Edward was crowned king of England, and married Editha as he had promiſed. The marriage, however, proved rather a ſource of diſcord than otherwiſe between the king and Godwin. Editha, though a very amiable woman, could never obtain the confidence and affection of her huſband. It is even ſaid, that, during the whole courſe of her life, he abſtained from all matrimonial converſe with her; and this ridiculous behaviour was highly celebrated by the monkiſh writers of the age, and contributed to the king's acquiring the title of Saint and Confeſſor.

78
Edward the Confeſſor.

Though the neglect of his daughter could not fail to awaken Godwin's former enmity againſt king Edward, it was neceſſary to chooſe a more popular ground before he could vent his complaints againſt the king in a public manner. He therefore choſe for his theme the influence which the Normans had on the affairs of government; and a declared oppoſition took place between him and theſe favourites. In a ſhort time, this animoſity openly broke out with great violence. Euſtace count of Bologne having paid a viſit to the king, paſſed by Dover on his return. One of his train being refuſed acceſs to a lodging which had been appointed for him, attempted to make his way by force, and wounded the maſter of the houſe in the conteſt. The townſmen revenged this inſult by the death of the ſtranger; the count and his train took arms, and murdered the townſman in his own houſe. A tumult enſued; near 20 perſons were killed on each ſide; and Euſtace, being overpowered with numbers, was at laſt obliged to fly. He complained to the king; who gave orders to earl Godwin, in whoſe government Dover lay, to puniſh the inhabitants. But this nobleman refuſed to obey the command, and endeavoured to throw the whole blame on count Euſtace and his followers. The king was diſpleaſed; and threatened to make him feel the utmoſt effects of his reſentment, in caſe he finally refuſed to comply. Upon this, Godwin aſſembled a powerful army, on pretence of repreſſing ſome diſorders on the frontiers of Wales; but, inſtead of this, marched directly to Glouceſter, where the king at that time was without any military force, as ſuſpecting no danger.

79
Variance of the king and earl Godwin.

Edward perceiving his danger, applied to Siward duke of Northumberland, and Leofric duke of Mercia, two very powerful noblemen. They haſtened to him with ſuch followers as they could aſſemble, iſſuing orders at the ſame time for all the forces under their reſpective governments to march without delay to the defence of the king. Godwin, in the mean time, ſuffered himſelf to be deceived by negociations, till the king's army became ſo powerful, that he was not able to cope with it. He was therefore obliged to fly with his family to Flanders. Here he was protected by Baldwin earl of that country, together with his three ſons Gurth, Sweyn, and Toſti; the laſt of whom had married Baldwin's daughter. Harold and Leofwin, two other ſons of Godwin, took ſhelter in Ireland.

80
Godwin flies to Flanders.

After the flight of earl Godwin, he was proceeded againſt as a traitor by king Edward. His eſtates, and thoſe of his ſons, were confiſcated; his governments given to others; queen Editha was confined in a monaſtery; and the great power of this family, which had become formidable to the crown itſelf, ſeemed to be totally overthrown. Godwin, however, ſoon found means to retrieve his affairs. Having hired ſome ſhips, and manned them with his followers, he attempted to make a deſcent at Sandwich. The king, informed of his preparations, equipped a fleet which Godwin could not reſiſt, and he therefore retreated into the Flemiſh harbours. On his departure, the Engliſh diſmiſſed their armament. This Godwin had expected, and therefore kept himſelf in readineſs for the favourable opportunity. He immediately put to ſea, and ſailed to the Iſle of Wight, where he was joined by Harold with a ſquadron which he had collected in Ireland. Being thus maſter of the ſea, Godwin entered the harbours on the ſouthern coaſt; ſeized all the ſhips; and being joined by great numbers of his former vaſſals, he ſailed up the Thames, and appeared before London.

81
Returns, and is reconciled with the king.

The approach of ſuch a formidable enemy threw every thing into confuſion. The king alone ſeemed reſolute to defend himſelf to the laſt extremity; but the interpoſition of many of the nobility, together with the ſubmiſſions of Godwin himſelf, at laſt produced an accommodation. It was ſtipulated, that Godwin ſhould give hoſtages for his good behaviour, and that all the foreigners ſhould be baniſhed the kingdom; after which, Edward, ſenſible that he had not power ſufficient to detain the earl's hoſtages in England, ſent them over to his kinſman the young duke of Normandy.

82
His ſon Harold aſpires to the crown.

Soon after this reconciliation, Godwin died as he was ſitting at table with the king. He was ſucceeded in the government of Weſſex, Suſſex, Kent, and Eſſex, and in the office of ſteward of the houſehold, a place of great power, by his ſon Harold. The ſon was no leſs ambitious than the father had been; and as he was a man of much greater abilities, he became a more dangerous enemy to Edward than even Godwin had been. Edward knew no better expedient to prevent the increaſe of Harold's power, than by giving him a rival. This was Algar ſon of Leofric duke of Mercia, whom he inveſted with the government of Eaſt Anglia, which had formerly belonged to Harold. The latter, however, after ſome broils, finally got the better of his rival, and baniſhed him the kingdom. Algar returned ſoon after with an army of Norwegians, with whom he invaded Eaſt Anglia; but his death in a ſhort time freed Harold from all further apprehenſions from that quarter. His power was ſtill further increaſed in a ſhort time after by the acceſſion of his brother Toſti to the government of Northumberland; and Edward now declining in years, and apprehenſive that Harold would attempt to uſurp the crown after his death, reſolved to appoint a ſucceſſor. He therefore ſent a deputation into Hungary, to invite over his nephew, Edward, ſon to his elder brother, who was the only remaining heir of the Saxon line. That prince accordingly came over with his children, Edgar Atheling, Margaret, and Chriſtina; but died a few days after his arrival. His death threw the king into greater perplexity than ever. Being reſolved to exclude Harold if poſſible, he ſecretly caſt his eye on his kinſman William duke of Normandy; a perſon of whoſe power, character, and capacity, he had juſtly a very high opinion. This advice had formerly been given him by Robert archbiſhop of Canterbury, who was himſelf a Norman, and had been baniſhed along with the reſt upon the return of earl Godwin. But Edward finding that the Engliſh would more eaſily acquieſce in the reſtoration of the Saxon line, had in the mean time invited his brother's deſcendants from Hungary as already mentioned. The death of his nephew, and the inexperience and unpromiſing qualities of young Edgar, made him reſume his former intentions in favour of the duke of Normandy, though his averſion to hazardous enterpriſes engaged him to poſtpone the execution, and even to keep his purpoſe concealed from all his miniſters.

Harold in the mean time increaſed his popularity by all poſſible means, in order to prepare his way for being advanced to the throne after the death of Edward, which now ſeemed to be faſt approaching. He had no ſuſpicion of the duke of Normandy as a rival; but as he knew that a ſon and grandſon of the earl Godwin were in the hands of that prince as hoſtages, he feared that they might be made uſe of as checks upon his ambition, in caſe he attempted afterwards to aſcend the throne. He therefore prevailed upon Edward to releaſe theſe hoſtages unconditionally; and having obtained his conſent, he ſet out for Normandy himſelf, attended by a numerous retinue. He was driven by a tempeſt on the territory of Guy count of Ponthieu, who detained him priſoner, and demanded an exorbitant ſum for his ranſom. Harold found means to acquaint William with his ſituation. The duke of Normandy, deſirous of gaining Harold over to his party, commanded Guy to reſtore his priſoner to his liberty. Upon this Harold was immediately put into the hands of the Norman ambaſſador, who conducted him to Rouen. William received him with great demonſtrations of reſpect and friendſhip; but ſoon took an opportunity of acquainting him with his pretenſions to the crown of England, and aſked his aſſiſtance in the execution of his ſcheme. Harold was ſurpriſed with this declaration of the duke; but, being entirely in his power, he feigned a compliance with his deſires, and promiſed to ſecond to the utmoſt of his ability the will of king Edward. William, to ſecure him as much as poſſible to his intereſt, promiſed him his daughter in marriage, and required him to take an oath that he would fulfil his promiſes. Harold readily complied; but to make the oath more binding, William privately conveyed under the altar where the oath was taken, reliques of ſome of the moſt revered martyrs; and when Harold had taken the oath, he ſhewed him the relics, and admoniſhed him to obſerve religiouſly ſuch a ſolemn engagement.

8
Harol
ceeds I
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Confeſ

Harold was no ſooner at liberty, than he found himſelf maſter of caſuiſtry ſufficient to excuſe the breaking of his oath which had been extorted from him, and which, if kept, might be attended with the ſubjection of his country to a foreign power. He continued to practiſe every art to increaſe his popularity; and about this time, two accidents enabled him to add much to that character which he had already ſo well eſtabliſhed. The Welſh had for ſome time made incurſions into the Engliſh territories, and had lately become ſo troubleſome, that Harold thought he could not do a more acceptable piece of ſervice to the public, than undertake an expedition againſt theſe invaders. Having therefore prepared ſome light-armed foot to purſue the natives into their fortreſſes, ſome cavalry to ſecure the open country, and a ſquadron of ſhips to attack the ſea-coaſts, he employed all theſe forces againſt the enemy at once; and thus reduced them to ſuch diſtreſs, that they were obliged to purchaſe peace by ſending their prince's head to Harold, and ſubmitting to the government of two Welſh noblemen appointed by Edward.

The other incident was no leſs honourable to Harold. Toſti his brother had been created duke of Northumberland; but, being of a violent tyrannical temper, had treated the inhabitants with ſuch cruelty, that they roſe in rebellion againſt him, and drove him from his government. Morcar and Edwin, two brothers, grandſons of the great duke Leofric, joined in the inſurrection; and the former being elected duke, advanced with an army to oppoſe Harold, who had been commiſſioned by the king to reduce and puniſh the Northumbrians. Before the armies engaged, Morcar endeavoured to juſtify his conduct, and repreſented to Harold, that Toſti had behaved in ſuch a manner that no one, not even a brother, could defend him without participating of the infamy of his conduct: that the Northumbrians were willing to ſubmit to the king, but required a governor that would pay ſome attention to their privileges; and they truſted that Harold would not defend in another that violent conduct from which his own government had always kept at ſo great a diſtance. This ſpeech was accompanied by ſuch a detail of well-ſupported facts, that Harold abandoned his brother's cauſe; and returning to Edward, perſuaded him to pardon the Northumbrians, and confirm Morcar in his government. He even married the ſiſter of that nobleman; and by his intereſt procured Edwin the younger brother to be choſen governor of Mercia. Toſti, in a rage, departed the kingdom, and took ſhelter in Flanders with Baldwin his father-in-law; while William of Normandy ſaw that now he had nothing to expect from Harold, who plainly intended to ſecure the crown for himſelf.

83
Harold ſucceeds Edward the Confeſſor.

Edward died in 1067, and was ſucceeded by Harold with as little oppoſition as though he had been the lawful heir. The very day after Edward's death, he was anointed and crowned by the archbiſhop of York. The whole nation ſeemed joyfully to ſwear allegiance to him. But he did not long enjoy the crown, to obtain which he had taken ſo much pains, and which he ſeemed to have ſuch capacity for wearing. His brother Toſti, provoked at his ſucceſs, ſtirred up againſt him every enemy he could have any influence with. The duke of Normandy alſo was enraged to the laſt degree at the perfidy of Harold; but before he commenced hoſtilities, he ſent an embaſſy to England, upbraiding the king with his breach of faith, and ſummoning him to reſign the kingdom immediately. Harold replied, that the oath, with which he was reproached, had been extorted by the well-grounded fear of violence, and for that reaſon could never be regarded as obligatory: that he never had any commiſſion either from the late king or the ſtates of England, who alone could diſpoſe of the crown, to make any tender of the ſucceſſion to the duke of Normandy; and if he, a private perſon, had aſſumed ſo much authority, and had even voluntarily ſworn to ſupport the duke's pretenſions, the oath was unlawful, and it was his duty to take the firſt opportunity of breaking it: that he had obtained the crown by the unanimous ſuffrages of the people; and ſhould ſhew himſelf totally unworthy of their favour, did he not ſtrenuouſly maintain thoſe liberties with which they had entruſted him: and that the duke, if he made any attempt by force of arms, ſhould experience the power of an united nation, conducted by a prince, who, ſenſible of the obligations impoſed on him by his royal dignity, was determined, that the ſame moment ſhould put a period to his life and to his government.

This anſwer was according to William's expectations, and therefore he had already made preparations for invading England. He was encouraged and aſſiſted in this enterpriſe by Howel count of Brittany, Baldwin earl of Flanders, the emperor Henry IV. and pope Alexander II. The latter declared Harold a perjured uſurper; denounced excommunication againſt him and his adherents; and the more to encourage William in his enterpriſe, ſent him a conſecrated banner, and a ring with one of St Peter's hairs in it. Thus he was enabled to aſſemble a fleet of 3000 veſſels, on board of which were embarked 60,000 men, choſen from among thoſe numerous ſupplies which were ſent him from all quarters. Many eminent perſonages were enliſted under his banners. The moſt celebrated were Euſtace count of Boulogne, Aimeri de Thouars, Hugh d'Eſtaples, William d'Evreux, Geoffroy de Rotrou, Roger de Beaumont, William de Warenne, Roger de Montgomeri, Hugh de Grantmeſnil, Charles Martel, and Geoffroy Gifford.

84
Defeats the Danes.

In order to embarraſs the affairs of Harold the more effectually, William alſo excited Toſti, in concert with Halfager king of Norway, to infeſt the Engliſh coaſts. Theſe two having collected a fleet of 350 ſhips, ſailed up the Humber, and diſembarked their troops, who began to commit great depredations. They were oppoſed by Morcar earl or duke (B) of Northumberland, and Edwin earl of Mercia, who were defeated. Harold, on the news of this invaſion, aſſembled a conſiderable army, engaged the enemy at Standford, and after a bloody battle entirely defeated them. Toſti and Halfager were killed in the action, and all the fleet fell into the hands of the victors; but Harold generouſly allowed Olave the ſon of Halfager to depart with 20 veſſels.

The king of England had ſcarce time to rejoice on account of his victory, when news were brought him that the Normans were landed in Suſſex. Harold's victory had conſiderably weakened his army. He loſt many of his braveſt officers and ſoldiers in the action; and he diſguſted the reſt, by refuſing to diſtribute the Daniſh ſpoils among them. He haſtened, however, by quick marches, to repel this new invader; but though he was reinforced at London and other places with freſh troops, he found himſelf weakened by the deſertion of his old ſoldiers, who, from fatigue and diſcontent, ſecretly withdrew from their colours. Gurth,

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(B) Anciently theſe two titles were ſynonimous.

the brother of Harold, a man of great conduct as well as bravery, became apprehenſive of the event; and entreated the king to avoid a general engagement for ſome time, or at leaſt not to hazard his perſon. But though this advice was in itſelf evidently proper, and enforced by all the arguments which Gurth could ſuggeſt, Harold continued deaf to every thing that could be ſaid. Accordingly, on the 14th of October 1066, the two armies engaged near Haſtings a town of Suſſex. After a moſt obſtinate and bloody battle *, the Engliſh were entirely defeated, Harold and his two brothers killed, and William left maſter of the kingdom of England.

85
Is defeated and killed by William of Normandy.

* See *Haſtings.*

Nothing could exceed the terror of the Engliſh upon the news of the defeat and death of Harold. As ſoon as William paſſed the Thames at Wallingford, Stigand, the primate, made ſubmiſſions to him in the name of the clergy; and before he came within ſight of London, all the chief nobility, and even Edgar Atheling himſelf, who, being the rightful heir to the throne, had juſt before been declared king, came and ſubmitted to the conqueror. William very readily accepted of the crown upon the terms that were offered him; which were, that he ſhould govern according to the eſtabliſhed cuſtoms of the country. He could indeed have made what terms he pleaſed; but, though really a conqueror, he choſe rather to be thought an elected king. For this reaſon he was crowned at Weſtminſter by the archbiſhop of York, and took the oath adminiſtered to the former kings of England; namely, that he would protect and defend the church, obſerve the laws of the realm, and govern the kingdom with impartiality.

86
William the Conqueror.

87
The Engliſh grievouſly oppreſſed.

The Engliſh hiſtorians complain of the moſt grievous oppreſſion by William and his Normans. Whether by his conduct the conqueror willingly gave the Engliſh opportunities of rebelling againſt him, in order to have a pretence for oppreſſing them afterwards, is not eaſy to ſay; but it is certain that the beginning of his reign cannot juſtly be blamed. The firſt diſguſt againſt his government was excited among the clergy. William could not avoid the rewarding of thoſe numerous adventurers who had accompanied him in his expedition. He firſt divided the lands of the Engliſh barons who had oppoſed him among his Norman barons; but as theſe were found inſufficient, he quartered the reſt on the rich abbeys, of which there were many in the kingdom, until ſome other opportunity of providing for them offered itſelf.

Though this laſt ſtep was highly reſented by the clergy, it gave very little offence to the laity. The whole nation, however, was ſoon after diſguſted, by ſeeing all the real power of the kingdom placed in the hands of the Normans. He diſarmed the city of London, and other places which appeared moſt warlike and populous, and quartered Norman ſoldiers wherever he dreaded an inſurrection. This was indeed acting as a *conqueror*, and not as an elected king; but the event ſhewed the neceſſity of ſuch precautions. The king having thus ſecured, as he imagined, England from any danger of a revolt, determined to pay a viſit to his Norman dominions. He appointed his brother Odo, biſhop of Bayeaux, and William Fitz-Oſborne, regents in his abſence; and to ſecure himſelf yet farther, he reſolved to carry along with him ſuch of the Engliſh nobility as he put the leaſt confidence in.

Having taken all theſe methods to enſure the tranquillity of his new kingdom, William ſet ſail for Normandy in March 1067; but his abſence produced the moſt fatal conſequences. Diſcontents and murmurings were multiplied every where; ſecret conſpiracies were entered into againſt the government; hoſtilities were commenced in many places; and every thing ſeemed to threaten a ſpeedy revolution. William of Poictiers, a Norman hiſtorian, throws the blame entirely on the Engliſh. He calls them a fickle and mutinous race, while he celebrates with the higheſt encomiums the juſtice and lenity of Odo's and Fitz-Oſborne's adminiſtration. On the other hand, the Engliſh hiſtorians tell us, that theſe governors took all opportunities of oppreſſing the people, either with a view to provoke them to rebellion, or, in caſe they tamely ſubmitted to their impoſitions, to grow rich by plundering them. Be this as it will, however, a ſecret conſpiracy was formed among the Engliſh for a general maſſacre of the Normans, like what had formerly been made of the Danes. This was proſecuted with ſo much animoſity, that the vaſſals of the earl of Coxo put him to death becauſe he refuſed to head them in the enterpriſe. The conſpirators had already taken the reſolution, and fixed the day for their intended maſſacre, which was to be on Aſh-Wedneſday, during the time of divine ſervice, when all the Normans would be unarmed as penitents, according to the diſcipline of the times. But the preſence of William diſconcerted all their ſchemes. Having got intelligence of their bloody purpoſe, he haſtened over to England. Such of the conſpirators as had been more open in their rebellion, conſulted their ſafety by flight; and this ſerved to confirm the proofs of an accuſation againſt thoſe who remained. From this time the king not only loſt all confidence in his Engliſh ſubjects, but regarded them as inveterate and irreconcileable enemies. He had already raiſed ſuch a number of fortreſſes in the country, that he no longer dreaded the tumultuous or tranſient efforts of a diſcontented multitude. He determined therefore to treat them as a conquered nation. The firſt inſtance of this treatment was his revival of the tax of *Danegelt*, which had been impoſed by the Daniſh conquerors, and was very odious to the people. This produced great diſcontents, and even inſurrections. The inhabitants of Exeter and Cornwal revolted; but were ſoon reduced, and obliged to implore the mercy of the conqueror. A more dangerous rebellion happened in the north; but this was alſo ſoon quaſhed, and the Engliſh became ſenſible that their deſtruction was intended. Their eaſy ſubmiſſion after the battle of Haſtings had inſpired the Normans with contempt; their commotions afterwards had rendered them objects of hatred; and they were now deprived of every expedient which could make them either regarded or beloved by their ſovereign. Many fled into foreign countries; and among the reſt Edgar Atheling himſelf, who made his eſcape to Scotland, and carried thither his two ſiſters Margaret and Chriſtina. They were well received by Malcolm, who ſoon after married Margaret the elder ſiſter, and alſo received great numbers of other exiles with the utmoſt kindneſs.

The Engliſh, though unable to make any reſiſtance openly, did not fail to gratify their reſentment againſt the Normans in a private manner. Seldom a day paſſed, but the bodies of aſſaſſinated Normans were found in the woods and high-ways, without any poſſibility of bringing the perpetrators to juſtice. Thus, at length, the conquerors themſelves began again to wiſh for tranquillity and ſecurity; and ſeveral of them, though entruſted with great commands, deſired to be diſmiſſed the ſervice. In order to prevent theſe deſertions, which William highly reſented, he was obliged to allure others to ſtay by the largeneſs of his bounties. The conſequences were, freſh exactions from the Engliſh, and new inſurrections on their part againſt their cruel maſters. The Norman power, however, was too well founded to be now removed, and every attempt of the Engliſh to regain their liberty ſerved only to rivet their chains the more firmly. The county of Northumberland, which had been moſt active in theſe inſurrections, now ſuffered moſt ſeverely. The whole of it was laid waſte, the houſes were burned, the inſtruments of agriculture deſtroyed, and the inhabitants forced to ſeek new places of abode. On this occaſion it is ſaid that above 100,000 perſons periſhed either by the ſword or famine; and the country is ſuppoſed even to this day, to retain the marks of its ancient depopulation. The eſtates of all the Engliſh gentry were next confiſcated, and beſtowed on the Normans. By this means all the ancient and honourable families were reduced to beggary; and the Engliſh found themſelves totally excluded from every road that led either to honour or preferment.

88 Diſſenſions in William's family.

By proceeding in this manner, William at laſt broke the ſpirit of the Engliſh nation, and received no farther trouble from them. In 1076, however, he found that the latter part of his life was likely to be unhappy through diſſenſions in his own family. He had four ſons, Robert, Richard, William, and Henry, beſides ſeveral daughters. Robert, his eldeſt ſon, ſurnamed *Curthoſe*, from the ſhortneſs of his legs, was a prince who inherited all the bravery and ambition of his family. He had formerly been promiſed by his father the government of the province of Maine in France, and was alſo declared ſucceſſor to the dukedom of Normandy. He demanded from his father the fulfilment of theſe promiſes; but William gave him a flat denial, obſerving, that "it was not his cuſtom to throw off his clothes till he went to bed." Robert declared his reſentment; and openly expreſſed his jealouſy of his two brothers William and Henry, (for Richard was killed, in hunting, by a ſtag.) An open rupture was ſoon commenced. The two young princes one day took it into their heads to throw water on their elder brother as he paſſed through the court after leaving their apartment. Robert conſtrued this frolic into a ſtudied indignity; and having theſe jealouſies ſtill farther inflamed by one of his favourites, he drew his ſword, and ran up ſtairs with an intent to take revenge. The whole caſtle was quickly filled with tumult, and it was not without ſome difficulty that the king himſelf was able to appeaſe it. But he could not allay the animoſity which from that moment prevailed in his family. Robert, attended by ſeveral of his confederates, withdrew to Rouen that very night, hoping to ſurpriſe the caſtle; but his deſign was defeated by the governor. The popular character of the prince, however, engaged all the young nobility of Normandy, as well as of Anjou and Britany, to eſpouſe his quarrel; even his mother is ſuppoſed to have ſupported him in his rebellion by ſecret remittances. The unnatural conteſt continued for ſeveral years; and William was at laſt obliged to have recourſe to England for ſupport againſt his own ſon. Accordingly, he drew an army of Engliſhmen together; he led them over to Normandy, where he ſoon compelled Robert and his adherents to quit the field, and was quickly reinſtated in all his dominions. Robert then took ſhelter in the caſtle of Gerberoy, which the king of France had provided for him, where he was ſhortly after beſieged by his father. As the garriſon was ſtrong, and conſcious of their treaſon, they made a gallant defence; and many ſkirmiſhes and duels were fought under its walls. In one of theſe the king and his ſon happened to meet; but being both concealed by their helmets, they attacked each other with mutual fury. The young prince wounded his father in the arm, and threw him from his horſe. The next blow would probably have put an end to his life, had he not called for aſſiſtance. Robert inſtantly recollected his father's voice, leaped from his horſe, and raiſed him from the ground. He proſtrated himſelf in his preſence, aſked pardon for his offences, and promiſed for the future a ſtrict adherence to his duty. The king was not ſo eaſily appeaſed; and perhaps his reſentment was heightened by the diſgrace of being overcome. He therefore gave his malediction to his ſon; and returned to his own camp on Robert's horſe, which he had aſſiſted him to mount. After ſome recollection, however, he was reconciled to Robert, and carried him with him into England.

William returned in 1081; and being now freed from his enemies both at home and abroad, began to have more leiſure to attend to his own domeſtic affairs. For this purpoſe the DOOMSDAY-*Book* was compoſed by his order, of which an account is given under that article. He reſerved a very ample revenue for the crown; and in the general diſtribution of land among his followers, kept poſſeſſion of now fewer than 1400 manors in different parts of the country. No king of England was ever ſo opulent; none was able to ſupport the ſplendor and magnificence of a court to ſuch a degree; none had ſo many places of truſt and profit to beſtow; and conſequently none ever had ſuch implicit obedience paid to his commands. He delighted greatly in hunting; and to indulge himſelf in this with the greater freedom, he depopulated the county of Hampſhire for 30 miles, turning out the inhabitants, deſtroying all the villages, and making the wretched outcaſts no compenſation for ſuch an injury. In the time of the Saxon kings, all noblemen without diſtinction had a right to hunt in the royal foreſts; but William appropriated all theſe to himſelf, and publiſhed very ſevere laws to prohibit his ſubjects from encroaching on this part of his prerogative. The killing of a boar, a deer, or even an hare, was puniſhed with the loſs of the delinquent's eyes; at the time when the killing of a man might be atoned for by paying a moderate fine or compoſition.

As the king's wealth and power were ſo great, it may reaſonably be ſuppoſed, that the riches of his miniſters were in proportion. Odo, biſhop of Bayeux, William's brother, was become ſo rich, that he reſolved

ved to purchaſe the papacy. For this purpoſe, taking the opportunity of the king's abſence, he equipped a veſſel in the Iſle of Wight, on board of which he ſent immenſe treaſures, and prepared for his embarkation. He was detained, however, by contrary winds; and, in the mean time, William, being informed of his deſigns, reſolved to prevent the exportation of ſo much wealth from his dominions. Returning therefore from Normandy, where he was at that time, he came to England the very inſtant his brother was ſtepping on board. He immediately ordered him to be made priſoner: but his attendants, reſpecting the biſhop's eccleſiaſtical character, ſcrupled to execute his commands; ſo that the king was obliged to ſeize him with his own hand. Odo appealed to the Pope: but the king replied, that he did not ſeize him as biſhop of Bayeux, but as earl of Kent; and, in that capacity, he expected, and would have, an account of his adminiſtration. He was therefore ſent priſoner to Normandy; and, notwithſtanding all the remonſtrances and threats of pope Gregory, was detained in cuſtody during the remainder of William's reign.

89 Death of the queen.

Soon after this, William felt a ſevere blow in the death of Matilda his queen; and, almoſt at the ſame time, received information of a general inſurrection in Maine, the nobility of which had always been averſe from his government. Upon his arrival on the continent, he found that the inſurgents had been ſecretly aſſiſted and excited by the king of France, who took all opportunities of leſſening the Norman power, by creating diſſenſions among the nobles. His diſpleaſure on this account was very much increaſed, by notice he received of ſome railleries thrown out againſt him by the French monarch. It ſeems that William, who was become corpulent, had been detained in bed ſome time by ſickneſs; and Philip was heard to ſay, that he only lay in of a big belly. This ſo provoked the Engliſh monarch, that he ſent him word, he would ſoon be up, and would, at his churching, preſent ſuch a number of tapers as would ſet the kingdom of France in a flame.

To perform this promiſe, he levied a powerful army; and, entering the Iſle of France, deſtroyed every thing with fire and ſword. He took the town of Mante, and reduced it to aſhes. But a period was ſoon put to the conqueſts and to the life of this great warrior by an accident. His horſe, happening to put his fore-feet on ſome hot aſhes, plunged ſo violently, that the rider was thrown forward, and bruiſed his belly on the pommel of the ſaddle. Being now in a bad habit of body, as well as ſomewhat advanced in years, he began to be apprehenſive of the conſequences, and ordered himſelf to be carried in a litter to the monaſtery of St Gervaiſe. Finding his illneſs increaſe, and being ſenſible of the approach of death, he diſcovered at laſt the vanity of all human grandeur; and was ſtruck with remorſe for thoſe many cruelties and violences of which he had been guilty. He endeavoured to make compenſation by preſents to churches and monaſteries, and gave orders for the liberation of ſeveral Engliſh noblemen. He was even prevailed upon, though not without reluctance, to releaſe his brother Odo, againſt whom he was very much incenſed. He left Normandy and Maine to his eldeſt ſon Robert. He wrote to Lanfranc the primate of England, deſiring him to crown William king of England. To Henry he bequeathed nothing but the poſſeſſions of his mother Matilda; but foretold, that one day he would ſurpaſs both his brothers in power and opulence. He expired on the 9th of September 1087, in the 63d year of his age, in the 21ſt of his reign over England, and 54th of that over Normandy.

90 And of the king.

91 William Rufus.

William, ſurnamed *Rufus* from his red hair, was in Normandy at the time of his father's illneſs. He no ſooner received the letter for Lanfranc, than, leaving his father in the agonies of death, he ſet out for England; where he arrived before intelligence of the deceaſe of the Conqueror had reached that kingdom. Being ſenſible that his brother Robert, as being the eldeſt ſon, had a preferable title to himſelf, he uſed the utmoſt diſpatch in getting himſelf firmly eſtabliſhed on the throne. The Engliſh were ſo effectually ſubdued, that they made no oppoſition; but the Norman barons were attached to Robert. This prince was brave, open, ſincere, and generous; and even his predominant fault of indolence was not diſagreeable to thoſe haughty barons, who affected an almoſt total independence of their ſovereign. The king, on the other hand, was violent, haughty, and tyrannical. A powerful conſpiracy was therefore carried on againſt William; and Odo, biſhop of Bayeux, undertook to conduct it. Many of the moſt powerful nobility were concerned; and as the conſpirators expected to be in a ſhort time ſupported by powerful ſuccours from Normandy, they retired to their caſtles, and put themſelves in an offenſive poſture.

William, ſenſible of his danger, engaged the Engliſh on his ſide, by promiſing ſome mitigation of their hardſhips, and liberty to hunt in the royal foreſts. Robert, in the mean time, through his natural indolence, neglected to give his allies proper aſſiſtance. The conſpirators were obliged to ſubmit. Some of them were pardoned; but moſt of them confiſcated, and their eſtates beſtowed on the barons who had continued faithful to the king.

92 Proves a tyrant.

William, freed from this danger, thought no more of his promiſes to the Engliſh. He proved a greater tyrant than his father; and, after the death of Lanfranc, who had been his preceptor, and kept him within ſome bounds, he gave full ſcope to his violent and rapacious diſpoſition. Not content with oppreſſing the laity, he invaded the privileges of the church; which, in thoſe days, were held moſt ſacred. He ſeized the temporalities of all the vacant biſhoprics and abbeys, and openly put to ſale thoſe ſees and abbeys which he thought proper to diſpoſe of.

93 Attempts the conqueſt of Normandy.

Theſe proceedings occaſioned great murmurs among the eccleſiaſtics, which were quickly ſpread through the nation, but the terror of William's authority preſerved the public tranquillity. In 1090, the king thought himſelf ſtrong enough to attempt the conqueſt of Normandy, which at that time was in the greateſt confuſion through the indolent and negligent adminiſtration of Robert. Several of the barons had revolted, and theſe revolts were encouraged by the king of France. Robert alſo imagined he had reaſon to fear the intrigues of his other brother Henry, whom for 3000 marks he had put in poſſeſſion of *Cotentin*, near a third part of the duchy of Normandy. He therefore threw him into priſon; but finding himſelf threatened with an invaſion from the king of England, he gave Henry his liberty, and even made uſe of his aſſiſtance in ſuppreſſing the inſurrections of his rebellious ſubjects. William, however, was no ſooner landed in Normandy, than the nobility on both ſides interpoſed, and a treaty of peace was concluded. In this treaty Henry finding his intereſts entirely neglected, retired to St Michael's Mount, a ſtrong fortreſs on the coaſt of Normandy, and infeſted the neighbourhood with his incurſions. He was beſieged by his two brothers, and obliged to capitulate in a ſhort time; after which, being deprived of all his dominions, he wandered about for ſome time with very few attendants, and often in great poverty.

The peace with Robert was of no long duration. In the interval ſome hoſtilities with Scotland ſucceeded, and theſe terminated in the death of Malcolm king of that country; after which new broils enſued with Normandy. The rapacious temper of William prompted him to encroach upon his brother's territories, and the ſame rapacity prompted him to uſe a very extraordinary expedient in order to accompliſh his deſigns. Having gone over to Normandy to ſupport his partiſans, he ordered an army of 20,000 men to be raiſed in England, and conducted to the ſea-coaſt as if they were to be immediately embarked: but when they came there, inſtead of embarking, they were forced to pay the king ten ſhillings a man; after which they were diſmiſſed to their ſeveral counties. With this money William engaged the king of France to depart from the protection of Robert; and alſo bribed many of the Norman barons to revolt. He was called from Normandy, however, by an irruption of the Welſh; and having repulſed them, he was prevented from attempting other enterpriſes by a conſpiracy of his barons.

94
Purchaſes the duchy for 10,000 marks.

In 1096, however, the ſuperſtition of Robert put the king of England in poſſeſſion of thoſe dominions which he had not been able to conquer by force of arms. The cruſades were now commenced, and Robert was deſirous of undertaking an expedition into the Holy Land. As money for this purpoſe was wanting, he mortgaged his dominions to his brother for 10,000 merks. The king raiſed the money by violent extortions on his ſubjects; forcing even the convents to melt their plate, in order to furniſh the quota demanded of them. He was then put in poſſeſſion of Normandy and Maine; and Robert with a magnificent train ſet out for the Holy Land.

After the death of Lanfranc, the king had retained in his own hands the revenues of Canterbury, as he had done thoſe of many other biſhoprics; but falling into a dangerous illneſs, he was ſeized with remorſe; and the clergy repreſented to him that he was in danger of eternal perdition if he did not make atonement for thoſe impieties and ſacrileges of which he had been guilty. He therefore inſtantly reſolved to ſupply the vacancy of Canterbury: he ſent for Anſelm, a Piedmonteſe by birth, abbot of Bec in Normandy, who was much celebrated for his piety and devotion. The abbot refuſed the dignity with great earneſtneſs; fell on his knees, wept, and entreated the king to change his purpoſe; and when he found him obſtinate in forcing the paſtoral ſtaff upon him, he kept his fiſt ſo hard clenched, that it required the utmoſt violence of the byſtanders to open it, and force him to receive that enſign of his ſpiritual dignity. William ſoon after recovered his health, and with it his violence and rapacity. As he now ſpared the church no more than before, a quarrel with Anſelm ſoon enſued; and this was the more dangerous to the king, on account of the great character for piety which the primate had acquired by his zeal againſt abuſes of all kinds, particularly thoſe of dreſs and ornament.

95
His quarrel with the primate.

At this time there was a mode which prevailed not only in England, but throughout Europe, both among men and women, of giving an enormous length to their ſhoes, drawing the toe to a ſharp point, and affixing to it the figure of a bird's bill, or ſome ſuch ornament, which was turned upwards, and which was often ſuſtained by gold or ſilver chains tied to the knee. The eccleſiaſtics took exception at this ornament, which they ſaid was an attempt to bely the ſcripture, where it is affirmed, that no man can add a cubit to his ſtature; and they not only declaimed againſt it with vehemence, but aſſembled ſome ſynods, in which the faſhion was abſolutely condemned. Such, however, are the contradictions in human nature, that all the influence of the clergy, which at that time was ſufficient to ſend vaſt multitudes of people into Aſia to butcher one another, was not able to prevail againſt thoſe long-pointed ſhoes. The faſhion, contrary to what hath happened to almoſt all others, maintained its ground for ſeveral centuries; and even Anſelm found his endeavours againſt it ineffectual. He was more ſucceſsful in decrying the long hair and curled locks then worn by the courtiers. He refuſed the aſhes on Aſh-Wedneſday to ſuch as were ſo accoutred; and his authority and eloquence had ſuch influence, that the young men univerſally abandoned that ornament, and appeared in the cropt hair recommended to them by the ſermons of the primate. For this reformation Anſelm is highly celebrated by his hiſtorian Eadmer, who was alſo his companion and ſecretary.

When William's profaneneſs returned with his health, he was engaged in almoſt perpetual conteſts with this auſtere prelate *. Theſe were pretty well ſettled, when the king, who had undertaken an expedition into Wales, required Anſelm to furniſh him with a certain number of ſoldiers. The primate regarded this as an invaſion of the rights of the church; and therefore, tho' he durſt not refuſe compliance, ſent the men ſo miſerably accoutred, that the king was exceedingly diſpleaſed, and threatened him with a proſecution. Anſelm demanded reſtitution of all his revenues which the king had ſeized, and appealed to the Pope. The quarrel, however, ran ſo high that the primate found it dangerous to remain in England. He deſired and obtained the king's permiſſion to retire beyond ſea. His temporalities were confiſcated immediately on his departure; but pope Urban received him as a martyr in the cauſe of religion, and even threatened the king with ſentence of excommunication. William, however, proceeded in his projects of ambition and violence, without regarding the threats of the Pope; who he knew was at that time too much engaged with the cruſades, to mind any other buſineſs. Though his acquiſition of Maine and Normandy had brought him into perpetual conteſts with the haughty and turbulent barons who inhabited thoſe countries, and raiſed endleſs tumults and inſurrections; yet William ſeemed ſtill intent on extending his dominions either by purchaſe or

96
Who leaves the kingdom.

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* See *Anſelm.*

conqueſt. William earl of Poictiers and duke of Guienne had reſolved upon an expedition to the holy land; and, for this purpoſe, had put himſelf at the head of a vaſt multitude, conſiſting, according to ſome hiſtorians, of 60,000 horſe, and a much greater number of foot. Like Robert of Normandy, he offered to mortgage his dominions for money ſufficient to conduct this multitude into Aſia. The king accepted his offer; and had prepared a fleet and army to take poſſeſſion of theſe dominions, when an unfortunate accident put an end to his projects and his life. He was engaged in hunting, the ſole amuſement, and indeed the principal occupation, of princes in thoſe rude times.

97 Death of the king.

Walter Tyrrel, a French gentleman remarkable for his ſkill in archery, attended him in this recreation, of which the new foreſt was the ſcene. William had diſmounted after a chace; and Tyrrel, impatient to ſhew his dexterity, let fly an arrow at a ſtag which ſuddenly ſtarted before him. The arrow glanced from a tree, and ſtruck the king to the heart. He inſtantly fell down dead; and Tyrrel, terrified at the accident, clapt ſpurs to his horſe, haſtened to the ſea-ſhore, and embarked for France, where he joined the cruſade that was ſetting out from that country. This happened on the 2d of Auguſt 1100, after the king had reigned 13 years, and lived about 40. His body was found in the woods by the country-people, and buried without ceremony at Wincheſter.

After the death of William, the crown of right devolved to Robert his eldeſt brother; for William had no legitimate children. But what Robert had formerly loſt by his indolence, he was again deprived of by his abſence at the holy war.

98 Prince Henry uſurps the crown.

Prince Henry was in the foreſt with William Rufus at the time the latter was killed. He no ſooner heard the important news, than he hurried to Wincheſter, and ſecured the royal treaſure. William de Breteuil, keeper of the treaſure, arrived almoſt the ſame inſtant, and oppoſed his pretenſions; telling him, that the treaſure belonged to his elder brother, who was now his ſovereign, and for whom he was determined to keep it. But Henry, drawing his ſword, threatened him with inſtant death if he dared to diſobey him; and others of the late king's retinue, who came every moment to Wincheſter, joining the prince's party, he was obliged to deſiſt. Henry loſt no time in fully accompliſhing his purpoſe. In leſs than three days he got himſelf crowned king of England, by Maurice biſhop of London. Preſent poſſeſſion ſupplied every deficiency of title; and no one dared to appear in defence of the abſent prince.

99 His charter in favour of the people.

The beginning of king Henry's reign promiſed to be favourable to the Engliſh liberty; owing chiefly to his fear of his brother. To conciliate the affections of his ſubjects, he paſſed a charter calculated to remove many of the grievous oppreſſions which had been complained of during the reigns of his father and brother. He promiſed, that, at the death of any abbot or biſhop, he never would ſeize the revenues of the ſee or abbey during the vacancy, but would leave the whole to be reaped by the ſucceſſor; and that he would never let to farm any eccleſiaſtical benefice, or diſpoſe of it for money. To the laity he promiſed, that, upon the death of any earl, baron, or military tenant, his heir ſhould be admitted to the poſſeſſion of his eſtate, on paying a juſt and lawful relief; without being expoſed to thoſe enormous exactions which had been formerly required. He remitted the wardſhip of minors; and allowed guardians to be appointed, who ſhould be anſwerable for the truſt. He promiſed not to diſpoſe of any heireſs in marriage but by advice of all the barons; and if any baron intended to give his daughter, ſiſter, niece, or kinſwoman, in marriage, it ſhould only be neceſſary for him to conſult the king, who promiſed to take no money for his conſent, nor ever to refuſe permiſſion, unleſs the perſon to whom it was propoſed to marry her ſhould happen to be his enemy. He granted his barons and military tenants the power of bequeathing by will their money or perſonal eſtates; and if they neglected to make a will, he promiſed that their heirs ſhould ſucceed to them. He renounced the right of impoſing moneyage, and of levying taxes at pleaſure, on the farms which the barons kept in their own hands. He made ſome general profeſſions of moderating fines; he offered a pardon for all offences; and remitted all debts due to the crown. He alſo required, that the vaſſals of the barons ſhould enjoy the ſame privileges which he granted to his own barons; and he promiſed a general confirmation and obſervance of the *laws of king Edward* [*]. To give greater authenticity to theſe conceſſions, a copy of the charter was lodged in ſome abbey of each county.

King Henry, farther to increaſe his popularity, degraded and committed to priſon Ralph Flambard biſhop of Durham, who had been the chief inſtrument of oppreſſion under his brother.

100 Quarrels with the primate.

He ſent for Anſelm who was then at Lyons, inviting him to return and take poſſeſſion of his dignities. Anſelm returned; but when Henry propoſed to him to do the ſame homage to him which he had done to his brother, the king met with an abſolute refuſal. During his exile, Anſelm had aſſiſted at the council of Bari; where, beſides fixing the controverſy between the Greek and Latin churches concerning the proceſſion of the Holy Ghoſt, the right of election to church-preferments was declared to belong to the clergy alone, and ſpiritual cenſures were denounced againſt all eccleſiaſtics who did homage to laymen for their ſees or benefices, and on all laymen who exacted it. The rite of homage [†] by the feudal cuſtoms was, that the vaſſal ſhould throw himſelf on his knees, put his joined hands between thoſe of his ſuperior, and ſhould in that poſture ſwear fealty to him. But the council declared it execrable, that pure hands, which could create God, and offer him up for the ſalvation of mankind, ſhould be put, after this humiliating manner, between profane hands, which, beſides being inured to rapine and bloodſhed, were employed day and night in impure purpoſes and obſcene contacts. To this decree therefore Anſelm appealed; and declared, that ſo far from doing homage for his ſpiritual dignity, he would not even communicate with any eccleſiaſtic who paid that ſubmiſſion, or who accepted of inveſtitures from laymen. Henry durſt not inſiſt; and therefore deſired that the controverſy might be ſuſpended, and that meſſengers might be ſent to Rome to accommodate matters with the Pope, and to obtain his confirmation of the laws and cuſtoms of England.

Henry now took another ſtep which ſeemed capable of confirming his claims to the crown without any danger of a rival. The Engliſh remembered with regret their Saxon monarchs, when they compared the liberty they enjoyed under them with the tyranny of the Normans. Some deſcendants of that favourite line ſtill remained; and among the reſt, Matilda, the niece of Edgar Atheling. Upon her the king fixed his eyes as a proper conſort, by whoſe means the breach between the Saxons and Normans might be cemented. A difficulty, however, occurred, becauſe ſhe had been educated in a nunnery. The affair was examined by Anſelm in a council of prelates and nobles ſummoned at Lambeth. Matilda there proved, that ſhe had put on the veil, not with a deſign of entering into a religious life, but merely in imitation of a cuſtom familiar to the Engliſh ladies, who protected their chaſtity from the brutal violence of the Normans by taking ſhelter under that habit, which amidſt the horrid licentiouſneſs of the times was yet generally revered. The council, ſenſible that even a princeſs had otherwiſe no ſecurity for her honour, admitted this reaſon as valid. They pronounced that Matilda was ſtill free to marry; and her nuptials with Henry were celebrated by Anſelm with great ſolemnity and pomp.

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[*] See Feodal Syſtem.

[†] See Feodal Tenure.

101
He marries
Matilda.

102
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laimed by
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While Henry was thus rendering himſelf popular at home, his brother Robert, who had loitered away a twelvemonth in Italy, where he married Sibylla daughter of the count of Converſana, arrived in England, in 1101, in order to put in his late and ineffectual claim to the crown. His fame, however, on account of the exploits he had performed in Paleſtine, was ſo great, that even yet he was joined by many noblemen of the firſt rank, and the whole nation ſeemed prepoſſeſſed in his favour. But Henry, having paid his court to Anſelm, by his means retained the army in his intereſts, and marched with them to Portſmouth, where Robert had landed his forces a few days before. The armies lay for ſome time in ſight of each other; when an accommodation was effected through the mediation of Anſelm and other great men. By this treaty it was agreed, that Robert ſhould reſign his pretenſions to England, and receive in lieu of them an annual penſion of 3000 marks; that if either of the princes died without iſſue, the other ſhould ſucceed to his dominions; that the adherents of each ſhould be pardoned, and reſtored to all their poſſeſſions either in Normandy or England; and that neither Robert nor Henry ſhould thenceforth encourage, receive, or protect, the enemies of each other.

The two princes ſeparated with mutual marks of friendſhip; but next year, Henry, under various pretences confiſcated the eſtates of almoſt all the noblemen who had favoured his brother's pretenſions. Robert, enraged at the fate of his friends, ventured to come to England in order to remonſtrate with his brother in perſon. But he met with ſuch a bad reception, that, apprehending his liberty to be in danger, he was glad to make his eſcape by reſigning his penſion.

93
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This infringement of the treaty was followed the enſuing year by an invaſion of Normandy, at the deſire of Robert's own ſubjects, whom he was totally incapable of governing *. The event of this war was the defeat and captivity of Robert, who was henceforth deprived not only of all his dominions, but of his perſonal liberty. He lived 28 years a priſoner, and died in the caſtle of Cardiff in Glamorganſhire. It is even ſaid by ſome, that he was deprived of his ſight by a red-hot copper-baſon applied to his eyes, and that king Henry appeaſed his conſcience by founding the monaſtery of Reading.

The conqueſt of Normandy was completed in 1006; and next year the controverſy between the king and primate, concerning the inveſtitures of clergymen and their doing homage to princes, was reſumed. The king was very ſenſible that it was not his intereſt to quarrel with ſuch a powerful body as the clergy were at that time; and on the other hand he fully underſtood the neceſſity of guarding the prerogatives of the crown from their encroachments. While, therefore, he avoided an open rupture with Anſelm, he obſtinately refuſed to give up the privileges which had been enjoyed by his predeceſſors. On the firſt arrival of Anſelm, the king had avoided the diſpute in the manner already mentioned. A meſſenger was diſpatched to Rome, in order to compromiſe matters with the Pope. The meſſenger returned with an abſolute refuſal of the king's demands. One of the reaſons given by the pope on this occaſion, was expreſſed in the following words: "It is monſtrous that a ſon ſhould pretend to beget his father, or a man to create his God: prieſts are called *gods* in ſcripture, as being the vicars of God: and will you, by your abominable pretenſions to grant them their inveſtiture, aſſume the right of creating them?" Henry was not yet convinced; but as he was determined to avoid, or at leaſt to delay, the coming to any dangerous extremity with the church, he perſuaded Anſelm, that by farther negociation he ſhould be able to compound matters with the Pope. Meſſengers were therefore diſpatched to Rome a ſecond time from the king; and alſo from Anſelm, who wanted to be fully aſſured of the pope's intentions. They returned with letters wrote in the moſt arrogant and poſitive manner, both to the king and primate. The king ſuppreſſed the letter ſent to himſelf; and perſuaded the three biſhops, by whom it was ſent, to aſſert, upon their epiſcopal faith, that the pope had aſſured them of his private good intentions towards king Henry, and of his reſolution not to reſent any future exertion of his prerogative in granting inveſtitures; though he himſelf ſcrupled to give this aſſurance under his hand, leſt other princes ſhould copy the example and aſſume a like privilege. Anſelm's two meſſengers, who were monks, affirmed that it was impoſſible this ſtory could have any foundation: but their word was not deemed equivalent to that of three biſhops; and the king, as if he had finally gained his cauſe, proceeded to fill the ſees of Hereford and Saliſbury, and to inveſt the new biſhops in the uſual manner. Anſelm, however, gave no credit to the aſſertions of the king's meſſengers; and therefore refuſed not only to conſecrate them, but even to communicate with them; and the biſhops themſelves, finding they were become univerſally odious, returned the enſigns of their ſpiritual dignity.

104
Quarrel
with the
primate.

The quarrel continued between the king and primate, till the latter, ſenſible of his dangerous ſituation, deſired leave to make a journey to Rome, in order to lay the caſe before the pope. This permiſſion was eaſily obtained; but no ſooner was the primate gone, than Henry confiſcated all his revenues, and ſent another meſſenger to negotiate with the pope. The new meſſenger told his holineſs, that his maſter would ſooner part with his crown than the right of granting inveſtitures. "And I, (replied the pope), would ra-

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ther loſe my head than allow him to retain it." This quarrel now became very dangerous to the king; as he was threatened by the pope with excommunication, which would have been attended with terrible conſequences. At laſt, however, a compromiſe was made in the following manner. Before biſhops took poſſeſſion of their dignities, they had formerly been accuſtomed to paſs through two ceremonials: They received, from the hands of the ſovereign, a ring and croſier as the ſymbols of their office, and this was called their *inveſtiture:* they alſo made thoſe ſubmiſſions to the prince, which were required of the vaſſals by the rites of the feudal law, and which received the name of *homage*. The pope, therefore, was for the preſent contented with Henry's reſigning his right of granting inveſtitures, by which the ſpiritual dignity was ſuppoſed to be conferred; and he allowed the biſhops to do homage for their temporal properties and privileges. After this, the pope allowed Anſelm to communicate with the prelates who had already received inveſtitures from the crown; and he only required of them ſome ſubmiſſions for their paſt conduct. He alſo granted to Anſelm a plenary power of remedying every diſorder, which he ſaid might ariſe from the barbarouſneſs of the country. About the ſame time, the marriage of prieſts was prohibited; and even laymen were not allowed to marry within the ſeventh degree of affinity. By this contrivance the pope augmented the profits which he reaped from granting diſpenſations, and likewiſe thoſe from divorces. For, as the art of writing was then rare, and pariſh-regiſters were not regularly kept, it was not eaſy to aſcertain the degrees of affinity even among people of rank; and any man who had money to pay for it, might obtain a divorce, on pretence that his wife was more nearly related to him than was permitted by the canons. A decree was alſo publiſhed, prohibiting the clergy to wear long hair; and the king, though he would not reſign his prerogatives to the church, very willingly cut his hair in the form which was required of him, obliging all the courtiers at the ſame time to follow his example.

105 Prince William drowned.

From the time of this compromiſe, which happened in 1107, to the year 1120, nothing remarkable happened except ſome ſlight commotions in Normandy: but this year, prince William, the king's only ſon, was unfortunately drowned off the coaſt of Normandy; and Henry was ſo much affected, that he is ſaid never afterwards to have ſmiled, or recovered his wonted cheerfulneſs. It is very doubtful, however, whether the death of this prince was not an advantage to the Britiſh nation, ſince he was often heard to expreſs the utmoſt hatred to the natives; inſomuch that he had threatened, that, when he came to the throne, he would make them draw the plough, and would turn them into beaſts of burden. Theſe prepoſſeſſions he inherited from his father; who, though he was wont, when it might ſerve his purpoſes, to value himſelf on his birth as a native of England, ſhewed, in the courſe of his government, an extreme prejudice againſt that people. All hopes of preferment to eccleſiaſtical as well as civil dignities were denied to the Engliſh during this whole reign; and any foreigner, however ignorant or worthleſs, was ſure to have the preference in every competition. The charter formerly mentioned, which the king granted at the beginning of his reign, was no more thought of; and the whole fell ſo much into neglect and oblivion, that in the following century, when the barons, who had heard an obſcure tradition of it, deſired to make it the model of the great charter which they exacted from king John, they could only find one copy of it in the whole kingdom; while the grievances, propoſed to be redreſſed by it, continued ſtill in their full extent.

106 Death of King Henry.

As Henry had now no legitimate children except Matilda, whom in 1110, he had betrothed, though only eight years of age, to the emperor of Germany, he was induced to marry a ſecond time in hopes of having ſons. He made his addreſſes accordingly to Adelais the daughter of Godfrey duke of Lovaine, and niece to pope Calixtus; a young princeſs of an amiable perſon. But Adelais brought him no children: and in 1135, the king died in Normandy, from eating too plentifully of lampreys; having lived 67 years, and reigned 35.

108 ſtrac te of gdo.

By the will of king Henry, his daughter Matilda became heireſs of all his dominions. She had been married, after her firſt huſband's death, to Geoffrey Plantagenet eldeſt ſon of the count of Anjou, by whom ſhe had a ſon named *Henry;* but as Geoffrey had given umbrage to the king of England in ſeveral inſtances, no notice was taken of him in the will. The nobility had already ſworn fealty to her; and the foremoſt to ſhew this mark of ſubmiſſion to the king's will had been Stephen, ſon of the count of Blois (who had married Adela the daughter of William the Conqueror.) He had been married to Matilda daughter and heireſs of Euſtace count of Boulogne; who brought him, beſides that feudal ſovereignty of France, a vaſt property in England, which in the diſtribution of lands had been conferred by the conqueror on the family of Boulogne. By this marriage Stephen acquired a new connection with the royal family of England: for Mary, his wife's mother, was ſiſter to David the preſent king of Scotland, and to Matilda the firſt wife of Henry and mother of the empreſs. The king alſo, imagining that by the aggrandizement of Stephen he ſtrengthened the intereſt of his own family, had enriched him with many poſſeſſions; but, inſtead of this, it appeared by the event that he had only put it more and more in his power to uſurp the throne.

107 Stephen uſurps the throne.

No ſooner was Henry dead, than Stephen haſtened from Normandy into England. The citizens of Dover and Canterbury, apprized of his purrpoſe, ſhut their gates againſt him; but when he arrived at London, ſome of the lower claſs of people, inſtigated by his emiſſaries, immediately proclaimed him king. The archbiſhop of Canterbury refuſed to give him the royal unction; but this difficulty was got over by Stephen's brother the biſhop of Wincheſter. Hugh Bigod, ſteward of the houſehold, made oath before the primate, that the late king, on his death-bed, had diſcovered a diſſatisfaction with his daughter Matilda, and had expreſſed his intention of leaving the count of Boulogne heir to all his dominions; and the biſhop, either believing, or pretending to believe, this teſtimony, gave Stephen the royal unction. Very few of the nobility attended his coronation; but none oppoſed his uſurpation, however unjuſt or flagrant.

Stephen, in order to eſtabliſh himſelf on the throne as firmly as poſſible, paſſed a charter, in which he made liberal promiſes to all ranks of men. To the clergy he promiſed, that he would ſpeedily fill all the vacant benefices, and never would levy any of the rents during the vacancy. To the nobility he gave liberty to hunt in their own foreſts; and to the people he promiſed to remit the tax of danegelt, and to reſtore the laws of Edward the Confeſſor. He ſeized the king's treaſure at Wincheſter, amounting to 100,000 pounds; with part of which money he hired mercenary ſoldiers from the continent; and with another part procured a bull from the Pope, confirming his title to the Engliſh throne.

Matilda, in the mean time, endeavoured to recover her juſt rights of which Stephen had deprived her; but for ſome time ſhe met with no ſucceſs either in England or Normandy. Her huſband Geoffrey himſelf was obliged to conclude a peace with Stephen, on condition of the king's paying him during that time an annual penſion of 5000 pounds.

Robert earl of Glouceſter was the firſt who ſhook the power of Stephen. He was natural ſon to the late king; a man of great honour and ability, and was very much attached to the intereſts of Matilda. When Stephen uſurped the throne, he offered to do him homage, and take the oath of fealty; but with an expreſs condition, that the king ſhould maintain all his ſtipulations, and never invade any of Robert's rights or dignities. With this condition Stephen was obliged to comply, on account of the great power of that nobleman, tho' he knew that it was meant only to afford him a favourable opportunity of revolting when occaſion ſerved. The clergy imitated Robert's example; and annexed to their oath of allegiance the following condition, namely, that they were only bound as long as the king defended the eccleſiaſtical liberties, and ſupported the diſcipline of the church. The barons, in return for their ſubmiſſion, exacted terms of ſtill more pernicious tendency. Many of them required to have the right of fortifying their caſtles, and putting themſelves in a poſture of defence; and with this exorbitant demand the king was forced to comply. All England was immediately filled with theſe fortreſſes; which the noblemen garriſoned either with their vaſſals, or with licentious ſoldiers, who flocked to them from all quarters. The whole kingdom now became a ſcene of rapine and devaſtation. Wars were carried on by the nobles in every quarter; the barons even aſſumed the right of coining money, and of exerciſing, without appeal, every act of juriſdiction; and the inferior gentry, as well as the people, finding no defence from the laws, during this total diſſolution of ſovereign authority, were obliged, for their immediate ſafety, to pay court to ſome neighbouring chieftain, and to purchaſe his protection, both by ſubmitting to his exactions, and by aſſiſting him in his rapine upon others.

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In 1137, the earl of Glouceſter having projected an inſurrection, retired beyond ſea, ſent the king a defiance, and ſolemnly renounced his allegiance. The next year David king of Scotland appeared with an army in defence of his niece's title; and, penetrating into Yorkſhire, committed the greateſt devaſtations. He was defeated, however, with great ſlaughter, at Northallerton, by ſome of the northern barons, who had raiſed a powerful army; and this ſucceſs ſo much overawed the malecontents in England, that Stephen's power might have received ſome ſtability, had he not unfortunately engaged himſelf in a conteſt with the clergy. He had already ſeen the miſchief ariſing from the liberty he had granted of fortifying ſo many caſtles in different parts of the kingdom. He therefore determined to abridge this liberty as much as poſſible; and for that purpoſe he began with the caſtles erected by the clergy, who ſeemed to have leſs right to theſe military ſecurities than the barons. Taking advantage therefore of a fray which had ariſen at court between the retinue of the biſhop of Saliſbury and the earl of Brittany, he ſeized the biſhops both of Saliſbury and Lincoln, threw them into priſon, and obliged them to deliver up the caſtles which they had lately erected. This produced ſuch a violent commotion, that the opportunity ſeemed favourable to the pretenſions of Matilda. On the 22d of September 1139, ſhe landed in England with Robert earl of Glouceſter, attended only by 140 knights; but her partizans daily increaſed, and ſhe was ſoon in a condition to face Stephen with equal forces in the field. Numberleſs encounters happened, the detail of which could afford very little entertainment to the reader. War was ſpread through every quarter; and the turbulent barons having, in a great meaſure, ſhaken off all reſtraint of government, and now obtained the ſanction of fighting in the cauſe of their country, redoubled their oppreſſions, tyrannies, and devaſtations. The caſtles of the nobility became receptacles of licenſed robbers; who, ſallying forth day and night, ſpoiled the open country, plundered the villages, and even cities. They tortured the captives to make them reveal their treaſures; ſold their perſons to ſlavery; and ſet fire to the houſes, after they had pillaged them of every thing valuable. In conſequence of this deſtruction, the land was left untilled; the inſtruments of huſbandry were abandoned; and a grievous famine reduced the nation to the moſt deplorable ſtate that can be imagined.

108
Matilda
lands in
England.

After a multitude of indeciſive conflicts, a battle enſued which ſeemed likely to enſure the public peace for ſome time. Stephen had marched his forces to relieve the city of Lincoln; the earl of Glouceſter led a body of troops to aſſiſt thoſe of Matilda's party, who were beſieging that place. The two armies engaged on the 2d of February within ſight of the city, and a deſperate battle enſued. At laſt Stephen's army was defeated. He himſelf was for ſome time left without attendants; and fought on foot in the midſt of his enemies, aſſaulted by multitudes, and reſiſting all their efforts with aſtoniſhing intrepidity. Being hemmed in on every ſide, he forced a way for ſome time with his battle-ax; but that breaking, he drew his ſword, and with it furiouſly aſſailed his antagoniſts for ſome time longer. But at length the ſword alſo flying in pieces, he was obliged to ſurrender himſelf a priſoner. He was conducted to Glouceſter; and tho' at firſt treated with reſpect, he was in a ſhort time, upon ſome ſuſpicions, thrown into irons.

109
Stephen defeated and
taken priſoner.

About a month after, Matilda was crowned at Wincheſter with great ſolemnity; but ſoon ſhewed herſelf totally incapable of governing ſuch a turbulent nation. She determined to repreſs the power of the nobles, who had now left only the ſhadow of authority to their ſovereign. But, being deſtitute of policy or prudence

110
Matilda
crowned.

ſufficient to accompliſh ſo difficult an undertaking, a conſpiracy was ſoon formed againſt her, and the biſhop of Wincheſter detached a party of his friends and vaſſals to block up the city of London where the queen reſided. At the ſame time meaſures were taken to inſtigate the Londoners to a revolt, and to ſeize the queen's perſon. Matilda, having timely notice of this conſpiracy, fled to Wincheſter. Here ſhe was ſoon after beſieged by the biſhop: but, the town being diſtreſſed by famine, ſhe with difficulty made her eſcape; while her brother the earl of Gloceſter, endeavouring to follow, was taken priſoner, and exchanged for Stephen.

111 Stephen reſtored.

Matilda was now obliged to take ſhelter in Oxford, while Stephen reaſcended the throne. The civil war broke out with redoubled fury. Many battles were fought, and both parties were involved in many diſtreſſes. Matilda eſcaped from Oxford at a time when the fields were covered with ſnow, by being dreſſed all in white, with four knights her attendants dreſſed in the ſame colour. Another time Stephen was ſurpriſed by the earl of Gloceſter at Wilton, and made his eſcape with the utmoſt difficulty. At laſt Matilda was obliged to quit the kingdom; and the death of the earl of Gloceſter ſoon after ſeemed to give a fatal blow to her intereſts. In 1153, however, prince Henry, Matilda's ſon by her ſecond huſband Geoffrey, came over to England, in order once more to diſpute Stephen's pretenſions to the crown. After ſome ſucceſs on his firſt landing, he was oppoſed by Stephen with a powerful army, and matters ſeemed likely to come to the deciſion of a general engagement. But while the two armies continued within a quarter of a mile of each other, a treaty was ſet on foot by the interpoſition of William earl of Arundel, for terminating the diſpute in an amicable manner. The death of Euſtace, Stephen's ſon, whom he had deſigned for the throne, which happened during the courſe of the treaty, facilitated its concluſion. It was agreed, that Stephen ſhould reign during his life, and that juſtice ſhould be adminiſtered in his name; that Henry, on Stephen's death, ſhould ſucceed to the kingdom; and that William, Stephen's ſon, ſhould inherit Boulogne and his patrimonial eſtate. This treaty filled all Europe with joy; and after the barons had ſworn to it, Henry left England, and Stephen returned to the peaceable enjoyment of his throne. His reign, however, was but of ſhort continuance; his death happening on the 25th of October 1154.

112. His death.

Henry was on the continent beſieging a caſtle of one of the mutinous barons, when news was brought him of Stephen's death. But, as he was ſenſible of the goodneſs of his title, he did not abandon his enterprize till the place was reduced. He then ſet out on his journey, and was received in England with the utmoſt joy. The firſt acts of his reign ſeemed to promiſe an happy and proſperous adminiſtration. He inſtantly diſmiſſed the mercenary ſoldiers who had committed the greateſt diſorders throughout the nation. He ordered all the caſtles which had been erected ſince the death of Henry I. to be demoliſhed, except a few which he retained in his own hands for the protection of the kingdom. The adulterated coin which had been ſtruck during the reign of Stephen was cried down, and new money ſtruck of the right value and ſtandard. He reſumed many of thoſe benefactions which had been made to churches and monaſteries in the former reigns. He gave charters to ſeveral towns, by which the citizens claimed their freedom and privileges independent of any ſuperior but himſelf. Theſe charters were the ground-work of the Engliſh liberty; for thus a new order, namely, the more opulent of the people, began to claim a ſhare in the adminiſtration, as well as the nobility and clergy. Thus the feudal government was at firſt impaired; and liberty began to be more equally diffuſed throughout the nation.

113 Henry II.

Henry II. on his acceſſion to the Britiſh throne, found himſelf poſſeſſed of very extenſive dominions on the continent. In the right of his father, he poſſeſſed Anjou, Touraine, and Maine; in that of his mother, Normandy; in that of his wife, Guienne, Poictou, Xaintogne, Auvergne, Perigord, Angouonois, and the Limouſin. Soon after, he annexed Brittany to his other ſtates, by marrying his ſon, who was yet a child, to the heireſs of Brittany, who was a child alſo, and was already in poſſeſſion of the ſuperiority over that province. Theſe territories compoſed above a third of the French monarchy, and were by far the moſt opulent part of it; ſo that Henry, though vaſſal to the king of France, was greatly ſuperior to him in power: and when England was added to all theſe, the French king had great reaſon to apprehend ſome diſaſter to himſelf and family. The king of England, however, reſided at too great a diſtance to be able to employ this formidable power with ſucceſs againſt the French monarch. He ſoon became a kind of ſtranger in his continental dominions; and his ſubjects there conſidered their allegiance as more naturally due to their ſuperior lord, who lived in their neighbourhood, and who was acknowledged to be the ſupreme head of their nation. Their immediate lord was often at too great a diſtance to protect them; and a commotion in any part of Henry's extenſive dominions gave great advantages againſt him. The wiſe and vigorous adminiſtration of Henry, however, counterbalanced in a great meaſure theſe diſadvantages; and he maintained a ſurpriſing tranquillity throughout his extenſive dominions during the greateſt part of his reign.

Henry found no great difficulty in circumſcribing the power of the barons; but when he attempted to do the ſame thing with the clergy, he met with the moſt violent oppoſition. That body had carried their independence on the civil power ſo far, that now they ſeemed to aim at nothing leſs than a liberty to commit all manner of crimes with impunity. During the reign of Stephen, they had extorted an immunity from all but eccleſiaſtical penalties*; and that grant they were reſolved to maintain for the future. It may eaſily be ſuppoſed, that a law which thus ſcreened their wickedneſs, contributed to increaſe it; and we accordingly find upon record, not leſs than 100 murders committed by men in holy orders, in the ſhort period ſince the king's acceſſion, not one of which was puniſhed even with degradation; while the biſhops themſelves ſeemed to glory in this horrid indulgence. The king did not make any attempts againſt them during the life of Theobald archbiſhop of Canterbury, who was a man of a mild character, and beſides had great merit, becauſe, during the former reign, he had refuſed to put the crown on the head of Euſtace, Stephen's ſon.

114 Monſtro wickedne the clerg

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* See (B nefit of) *Clergy*.

ſon. He died in 1162; and the king, after his death, advanced to the ſee of Canterbury Thomas a Becket, his chancellor, on whoſe compliance he thought he might entirely depend.

115 Conteſts of the king with Thomas a Becket.

The new archbiſhop was the firſt man of Engliſh pedigree, who, ſince the Norman conqueſt, had riſen to any conſiderable ſtation. Before his inſtalment in the ſee of Canterbury, Becket had been exceedingly complaiſant, good-humoured, and agreeable to his maſter; and had alſo been accuſtomed to live very freely. But no ſooner was he inveſted with this high dignity, than he totally altered his conduct, and put on all thoſe airs of affected and oſtentatious humility which could recommend him to the ſuperſtitious and ignorant multitude in that age. The firſt ſtep taken by this hypocrite after his advancement, was to reſign the office of chancellor. This he did without conſulting the king: the reaſon he gave was, that henceforth he muſt detach himſelf from ſecular affairs, and be ſolely employed in the duties of his ſacred function; but in reality, that he might break off all connexion with Henry. As he knew that the king intended to abridge the eccleſiaſtical power, he thought the beſt method would be to become himſelf the aggreſſor. He therefore ſummoned the earl of Clare to ſurrender the barony of Tunbridge; which, ever ſince the Conqueſt, had remained in the family of that nobleman; but which, as it had formerly belonged to the ſee of Canterbury, the primate pretended that his predeceſſors were prohibited by the canons from alienating.—William de Eynsford, a military tenant of the crown, was patron of a living which belonged to a manor that held of the archbiſhop of Canterbury; and Becket, without regard to William's right, preſented, on a new and illegal pretence, one Laurence to that living, who was violently expelled by Eynsford. Upon this, Eynsford was excommunicated. He complained to the king, that he, who held *in capite* of the crown, ſhould, contrary to the practice eſtabliſhed by the Conqueror, and maintained ever ſince by his ſucceſſors, be ſubjected to that terrible ſentence, without the previous conſent of the ſovereign. Henry, by a meſſenger, commanded Becket to abſolve Eynsford. The haughty primate anſwered, that it belonged not to the king to inform him whom he ſhould abſolve, and whom excommunicate; but, after all, he was obliged to comply with the king's orders, though with the worſt grace imaginable.

As Henry perceived that the crown was now in danger, through the ſuperſtition of the people, of falling totally under the power of the clergy, he reſolved to exert himſelf to the utmoſt againſt their ſcandalous uſurpations. Among their other inventions to obtain money, they had now inculcated the neceſſity of penance as an atonement for ſin; and having again introduced the practice of paying them large ſums as an equivalent for theſe penances, the ſins of the people had thus become a revenue to the prieſts; and the king computed, that, by this invention alone, they levied more money from his ſubjects than what flowed by all the funds and taxes into the royal exchequer. To eaſe the people of ſo heavy and arbitrary an impoſition, the king required, that a civil officer of his appointment ſhould be preſent in all eccleſiaſtical courts, and ſhould for the future give his conſent to every compoſition made for ſpiritual offences.—About this time alſo the king had an opportunity of proceeding againſt the clergy on another footing. A clerk in Worceſterſhire, having debauched a gentleman's daughter, murdered her father. The king required that the clerk ſhould be delivered up to the magiſtrate. Becket pleaded the privileges of the church; confined the criminal in the biſhop's priſon, leſt he ſhould be ſeized by the king's officers; and maintained that no greater puniſhment could be inflicted on him than degradation. The king then required, that, immediately after he was degraded, he ſhould be tried by the civil powers; but the primate aſſerted, that it was iniquitous to try a man twice upon the ſame accuſation, and for the ſame crime. Upon this, Henry ſummoned an aſſembly of all the prelates in England; and put to them this deciſive queſtion, Whether or not they were willing to ſubmit to the ancient laws and cuſtoms of the kingdom? The biſhops unanimouſly replied, that they were willing, *ſaving their own order*. The king was provoked to the laſt degree at this equivocal anſwer. He left the aſſembly with evident marks of diſpleaſure; and required the primate inſtantly to ſurrender the caſtles of Eye and Berkham. The other prelates were terrified; but Becket continued inflexible: however, he was at laſt prevailed upon, by the interpoſition of Philip the pope's legate and almoner, to retract the ſaving clauſe, and promiſe without any reſerve to obſerve the ancient cuſtoms.

The king was not now to be ſatisfied with general promiſes from the clergy. He was determined that the ancient laws and cuſtoms ſhould be defined, as well as the privileges of the clergy. He therefore ſummoned another great council of the clergy and nobility at Clarendon, to whom he ſubmitted this important affair. A number of regulations was there drawn up, which were afterwards well known by the title of the *Conſtitutions of Clarendon*. By theſe it was enacted, that clergymen accuſed of any crime ſhould be tried in the civil courts; that laymen ſhould not be tried in ſpiritual courts, except by legal and reputable witneſſes; that the king ſhould ultimately judge in eccleſiaſtical and ſpiritual appeals; that the archbiſhops and biſhops ſhould be regarded as barons, and obliged to contribute to the public expences like other perſons of their rank; that the goods forfeited to the king, ſhould not be protected in churches or church-yards by the clergy; and that the ſons of villeins ſhould not take orders without the conſent of their lord. Theſe, with ſome others of leſs conſequence, to the number of 16, were ſubſcribed by all the biſhops preſent, and even by Becket himſelf; who, at firſt, ſhewed ſome reluctance.

Nothing now remained but to get the conſtitutions ratified by the pope; but in this the king was diſappointed. The pope rejected them with the utmoſt indignation; and, out of 16, admitted only ſix, which he thought were not important enough to deſerve cenſure.—Becket was now mortified to the higheſt degree. He retracted his conſent to the conſtitutions, redoubled his auſterities, and even refuſed to execute any part of his ſacerdotal function till he had obtained abſolution from his holineſs. Henry, conſidering theſe humilities as inſults offered to himſelf, deſired the pope to ſend him a legate. He did ſo; but annexed a clauſe to his commiſſion, by which he was prohibited from acting againſt the archbiſhop of Canterbury. The king ſent back the commiſſion to the pope; and being now exaſperated beyond all patience, commenced furious proſecutions againſt Becket. He firſt ſued him for ſome lands belonging to his primacy; and Becket being detained by ſickneſs from coming into court, his non-attendance was conſtrued into diſreſpect. The primate afterwards defended his cauſe in perſon; but all his goods and chattels were confiſcated, and the biſhop of Wincheſter was obliged to pronounce the ſentence. Another ſuit was commenced againſt him for 300 pounds, which he had levied on the honours of Eye and Berkham, and the primate agreed to give ſecurities for the payment of the ſum. The next day a third ſuit was commenced againſt him for 1000 marks, which the king had lent him upon ſome former occaſion: and, immediately upon the back of theſe, a ſtill greater demand was made; namely, that Becket ſhould give an account of the money he had received and expended during the time he was chancellor. The money was computed at no leſs than 40,000 marks; and the primate, unable either to give an account, or find ſecurities, took the following extraordinary method of evading the king's deſigns. He arrayed himſelf in his epiſcopal veſtments; and, with the croſs in his hand, went forward to the palace. Having entered the royal apartments, he ſat down, holding up the croſs as his banner and protection. The king, who ſat in an inner apartment, ordered by proclamation all the prelates and nobility to attend him; to whom he loudly complained of Becket's inſolence. The whole council joined in condemning this inſtance of his unaccountable pride; and determined to expoſtulate with him about his inconſiſtency concerning the conſtitutions of Clarendon. But all their meſſages, threats, and arguments, were to no purpoſe. Becket put himſelf, in the moſt ſolemn manner, under the protection of the ſupreme pontiff, and appealed to him againſt any penalty which his iniquitous judges might think proper to inflict. Then, leaving the palace, he aſked the king's immediate permiſſion to quit Northampton; but being refuſed, he ſecretly withdrew in diſguiſe, and at laſt found means to croſs over to the continent.

116
Becket flies to the continent.

Becket was received with the greateſt marks of eſteem, firſt by the king of France, (who hated Henry on account of his great power), and then by the pope, whoſe cauſe he had ſo ſtrenuouſly defended in England. Henry at the ſame time ſent ambaſſadors to the pope, who were treated with coolneſs and contempt, while Becket was honoured with the greateſt marks of diſtinction. Theſe favours beſtowed upon an exile and a perjured traitor, (for ſuch had been Becket's ſentence of condemnation in England), irritated the king to ſuch a degree, that he reſolved to throw off at once all dependence upon the pope. He accordingly iſſued out orders to his juſticiaries; inhibiting, under ſevere penalties, all appeals to the pope or the archbiſhop; and forbidding any of them to receive mandates from them, or to apply to their authority. He declared it treaſonable to bring over from either of them any interdict upon the kingdom. This he made puniſhable in ſecular clergymen by the loſs of their livings, and by caſtration; in regulars, by the amputation of their feet; and in laymen, by death. On the other hand, the pope and the archbiſhop did not fail to iſſue forth their fulminations in ſuch a manner as to ſhake the very foundation of the king's authority. Becket excommunicated by name all the king's chief miniſters who had been concerned in ſequeſtrating the revenues of his ſee, and all who obeyed or favoured the conſtitutions of Clarendon. He even threatened to excommunicate the king if he did not ſpeedily repent; and had not the pope himſelf been threatened every day with the machinations of an antipope, whoſe pretenſions he was afraid the king of England might ſupport, the ſentence of excommunication would certainly have been denounced.

At firſt, Henry paid little regard to theſe fulminations; but afterwards, when he found that his authority over his ſubjects began to decline on that account, and that his rivals on the continent were endeavouring to diſturb the tranquillity of his dominions, he began ſincerely to deſire a reconciliation. This the pope and Becket alſo became deſirous of, becauſe they ſaw that their utmoſt endeavours were inſufficient to draw Henry's ſubjects into a revolt againſt him. The treaty of accommodation, however, was often broke off, through the extreme jealouſy of each of the parties; but at length, by the mediation of the pope's legate, all differences were adjuſted, and Becket was reinſtated in the ſee of Canterbury.

117
Is reſtored, and behaves with his former inſolence.

On the recovery of his dignity, the primate behaved with all his uſual arrogance. Inſtead of retiring quietly to his dioceſe when he landed in England, he made a progreſs through Kent with all the ſplendor and magnificence of a ſovereign pontiff. As he approached Southwark, the clergy, the laity, and all ranks of people, came forth to meet him, and celebrated his triumphal entry with hymns of joy. Being thus confident of the ſupport of the people, he reſolved to make his enemies feel the ſevereſt effects of his vengeance. He ſuſpended the archbiſhop of York, who had crowned Henry's eldeſt ſon in his abſence. He excommunicated the biſhops of London and Saliſbury, with ſome of the principal nobility and prelates who had aſſiſted at the coronation. One man he excommunicated for having ſpoken againſt him, and another for having cut off the tail of one of his horſes. The excommunicated and degraded prelates immediately made their complaints to the king; and he having dropped ſome paſſionate expreſſions intimating a deſire to have Becket's life taken away, the ſuppoſed will of the king was inſtantly accompliſhed; nor could the king's expreſs orders to the contrary arrive time enough to hinder the execution of this fatal purpoſe *.

118
Grief of the king for his death.

The king was thrown into the utmoſt conſternation on hearing of Becket's murder. He knew that the primate's death would accompliſh what his moſt violent oppoſition during his life could never have done, and therefore he gave himſelf up to ſorrow. For three days he even refuſed all nouriſhment; till at laſt his courtiers were obliged to break in upon his ſolitude, and induce him to acquieſce in an event which could not poſſibly be recalled. The pope was with ſome difficulty made ſenſible of the king's innocence; but refuſed to grant him a pardon, except on condition that he ſhould make every future ſubmiſſion and perform every injunction the holy ſee thought proper to demand.

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* See *Becket*.

demand. When things were thus adjuſted, the aſſaſſins who had murdered Becket were allowed to retire in ſafety to the enjoyment of their former dignities; and the king, with a view to divert the minds of the people to a different object, undertook an expedition into Ireland, and totally reduced that iſland†.

† See *Ireland.*

119 Diſſenſions in Henry's family.

The king was ſcarce freed from the war with Ireland, and the dangerous controverſy which he had engaged in with the church of Rome, when he found himſelf involved in the moſt unnatural conteſts with his children, to whom he had always behaved in the moſt tender and affectionate manner. He had ordered Henry his eldeſt ſon to be anointed king; and had deſtined him for his ſucceſſor in the kingdom of England, the duchy of Normandy, and the counties of Anjou, Maine, and Touraine; territories which lay contiguous, and which might thus eaſily lend their aſſiſtance to one another. Richard his ſecond ſon was inveſted in the duchy of Guienne and county of Poictou: Geoffrey, his third ſon, inherited, in right of his wife, the duchy of Brittany: and the new conqueſt of Ireland was deſtined for the appendage of John his fourth ſon, for whom he had negociated a marriage with Adelais the only daughter of Humbert count of Savoy and Maurienne; and with whom he was to receive as a dowry, very conſiderable demeſnes in Piedmont, Savoy, Breſſe, and Dauphiny. This greatneſs of Henry's family alarmed the king of France; and he therefore excited young prince Henry to demand of his father, either the immediate reſignation of the crown of England, or the duchy of Normandy. The king refuſed to comply with ſuch an extravagant demand; upon which the prince made his eſcape to Paris, where he was protected by the French king. This happened in 1173; and the ſame year, queen Eleanor, finding that ſhe was now grown very diſagreeable to the king, communicated her diſcontent to her two younger children Geoffrey and Richard, whom ſhe engaged alſo to demand the territories aſſigned them, and then fly to the court of France. The queen herſelf was meditating an eſcape to the ſame court, and had put on man's apparel foe that purpoſe, when ſhe was ſeized and confined by Henry's order. The licentious barons in the mean time wiſhed for a change of government; hoping to have liberty, under young and unexperienced princes, to commit thoſe rapines and violences which they could not do with ſafety when governed by ſuch a prudent and vigilant king as Henry. In the midſt of this univerſal defection, however, the Engliſh monarch ſtill retained his uſual intrepidity, and prepared with as much vigour as poſſible for the conteſt. As he could depend on the fidelity of very few of his nobility, he was obliged to enliſt in his ſervice a number of deſperate ruffians called *Brabençons*, and ſometimes *Routiers* or *Cottereaux*, though for what reaſon is not mentioned in hiſtory. Theſe banditti were very numerous during the times of the feudal government, when many private wars were carried on between the nobles; and 20,000 of theſe, with a few forces furniſhed by his faithful barons, compoſed the whole of Henry's army on this occaſion.

120 Queen Eleanor confined.

With this force the king of England totally overthrew the ſchemes of his enemies on the continent; but being very deſirous of putting an end to the war, he this very year (1173) agreed to a conference with the king of France. At this interview, Henry offered his children the moſt advantageous terms. He inſiſted only on retaining the ſovereign authority in all his dominions. To Henry he offered half the revenues of the crown of England, with ſome places of ſurety in that kingdom; or if he choſe rather to reſide in Normandy, half the revenues of that duchy, with all thoſe of Anjou. He made a like offer to Richard in Guienne; he promiſed to reſign all Brittany to Geoffrey; and if theſe conceſſions were not deemed ſufficient, he agreed to add to them whatever the Pope's legates, who were preſent, ſhould require of him. The conference, however, was broke off by the violence of the earl of Leiceſter; who not only reproached Henry in the moſt indecent manner, but even put his hand to his ſword, as if he intended to attempt ſome violence againſt him.

In the mean time, the moſt of the Engliſh nobility united in oppoſition againſt their ſovereign; and an irruption at this time by the king of Scotland aſſiſted their rebellious ſchemes. The earl of Leiceſter ſoon after invaded Suffolk at the head of a body of Flemings; but they were repulſed with great ſlaughter, and the earl himſelf was taken priſoner. Soon after, William king of Scotland, who had been repulſed, and agreed to a ceſſation of arms, broke the truce, and invaded England with an army of 80,000 men, committing the moſt terrible devaſtations. Henry in the mean time, to reconcile himſelf thoroughly to the church, performed the penances at the tomb of Thomas a Becket, which he had formerly promiſed to do. As ſoon as he came within ſight of the church of Canterbury, he alighted from his horſe, walked barefoot towards the town, and proſtrated himſelf before the ſhrine of the ſaint. He remained a whole day in prayer and faſting, watched the holy relics all night, made a grant of 50 pounds a-year to the convent for a conſtant ſupply of tapers to illuminate the ſhrine; and not ſatisfied with theſe ſubmiſſions, he aſſembled a chapter of monks, diſrobed himſelf before them, put a ſcourge into each of their hands, and preſented his bare ſhoulders to their ſtrokes. Next day he received abſolution; and, departing for London, had the agreeable news of the defeat and captivity of William king of Scotland, which happened on the very day of his abſolution.

121 King of Scotland defeated and taken priſoner.

This victory proved deciſive in Henry's favour. The Engliſh barons who had revolted, or were preparing for a revolt, inſtantly delivered up their caſtles to the victor, and the kingdom was in a few weeks reſtored to perfect tranquillity. Prince Henry, who was ready to embark with a great army to join the Engliſh rebels, abandoned all thoughts of the enterprize. Soon after, a treaty was concluded with the king of France; in which Henry granted his children much leſs advantageous terms than he had offered them before. The principal were ſome penſions for their ſupport, caſtles for their reſidence, and an indemnity to all their adherents. The greateſt ſufferer by this war was William king of Scotland. He was compelled to ſign a treaty, by which he obliged himſelf to do homage to Henry for the kingdom of Scotland. It was agreed, that his barons and biſhops ſhould do the ſame; and that the fortreſſes of Edinburgh, Stirling, Berwick, Roxburgh, and Jedburgh, ſhould be delivered into the hands of the conqueror, till the articles were performed

122 Owns himſelf Henry's vaſſal.

formed. This treaty was executed moſt punctually and rigorouſly on the 10th of Auguſt 1175. The king, barons, and prelates of Scotland, did homage to Henry in the cathedral of York; the greateſt humiliation to which the Scottiſh nation had ever been ſubjected.

123 New diſſenſions in Henry's family.

Henry was now freed from all troubles either at home or abroad, for five years; during which time he made ſeveral ſalutary laws for the good of his kingdom. But, in 1180, the ambitious ſpirits of his children involved him in freſh calamities. Richard, who had been inveſted by his father with the ſovereignty of Guienne, refuſed to do homage to his elder brother, as king Henry had required him to do. Young Henry and Geoffrey, uniting their arms, invaded their brother's dominions; and while the king was endeavouring to compoſe their differences, he found himſelf conſpired againſt by them all. The conſpiracy, however, was defeated by the death of prince Henry in 1183. He had retired to Martel, a caſtle near Turenne, where he was ſeized with a fever; and perceiving the approaches of death he was at laſt ſtruck with remorſe for his undutiful behaviour towards his father. He ſent a meſſenger to the king, who was not far diſtant; expreſſed his contrition for his faults; and intreated the favour of a viſit, that he might at leaſt die with the ſatisfaction of having received his forgiveneſs. The king, who had ſo often experienced his ſon's ingratitude and violence, apprehended that his ſickneſs was entirely a feint, and dared not truſt himſelf in the prince's hands. But ſoon after, receiving certain intelligence of his death, and proofs of his ſincere repentance, the good old king was affected with the deepeſt ſorrow. He thrice fainted away; he accuſed his own hard-heartedneſs in refuſing the dying requeſt of his ſon; and he lamented that he had deprived the prince of the laſt opportunity of making atonement for his offences.

Prince Henry, who died in the 28th year of his age, left no poſterity. His brother Richard ſucceeded to his dominions, and ſoon diſcovered as turbulent a ſpirit as that which had actuated his brother. He refuſed to give up Guienne, which Henry had deſigned for his fourth ſon John; and even made preparations for carrying on war againſt his father, and brother Geoffrey. Henry ſent for Eleanor his queen, the heireſs of Guienne; to whom Richard, either dreading an inſurrection in her favour, or out of a ſenſe of duty, willingly yielded up the territory, and retired peaceably to his father's court. This breach, however, was no ſooner made up, than Geoffrey, demanded Anjou to be added to his dominions in Brittany. This the king refuſed; upon which he fled to the court of France, and prepared to levy an army againſt his father. Henry, however, was freed from the danger which threatened him from that quarter, by his ſon's death, who was killed in a tournament at Paris. The loſs of this prince gave few, except the king himſelf, any uneaſineſs; for he was univerſally hated, and went among the people by the name of the *Child of Perdition*. The widow of Geoffrey, ſoon after his deceaſe, was delivered of a ſon, who received the name of *Arthur*, and was inveſted in the duchy of Britany, under the guardianſhip of his grandfather, who, as duke of Normandy, was alſo ſuperior lord of that territory. Philip, as lord paramount, diſputed for ſome time his title to this wardſhip; but was obliged to yield to the inclinations of the Bretons, who preferred the government of Henry. Some other cauſes inflamed the diſſenſion between theſe two monarchs, and Philip once more ſeduced Richard from his duty. He inſiſted that his marriage with Adelais, Philip's ſiſter, ſhould be immediately completed, and threatened to enforce his pretenſions with a formidable army. This occaſioned another conference between Giſors and Trie, the uſual place of meeting, under a vaſt elm that is ſaid to have ſhaded more than an acre. In the midſt of this conference the archbiſhop of Tyre appeared before the aſſembly in the moſt miſerable habit, and begged aſſiſtance againſt the Infidels, who, under Saladin, had almoſt totally expelled the Chriſtians from Aſia. His intelligence appeared ſo very diſmal, that the kings of France and England laid aſide their animoſity. Both of them immediately took the croſs; but Richard, who had long wiſhed to have all the glory of ſuch an expedition to himſelf, could not bear to have even his father for a partner in his victories. He therefore entered into a confederacy with the king of France; ſo that Henry found himſelf at laſt obliged to give up all thoughts of the cruſade, in order to defend himſelf againſt this unnatural combination. The event of the war proved very unfortunate for Henry, who loſt ſeveral towns, and narrowly eſcaped falling into the hands of the enemy himſelf. At laſt a treaty was concluded at the interceſſion of the duke of Burgundy, the count of Flanders, and the archbiſhop of Rheims; but upon terms very humiliating to the king of England. It was agreed, that Richard ſhould marry the princeſs Adelais, and be crowned king of England during the lifetime of his father; that Henry ſhould pay 20,000 marks to the king of France, as a compenſation for the charges of the war; that his own barons ſhould engage to make him obſerve this treaty, and, in caſe of violating it, to join Philip and Richard againſt him; and that all his vaſſals who had eſpouſed the cauſe of Richard ſhould receive an indemnity for their offence. Theſe terms, mortifying as they were, Henry bore with patience; but when, upon receiving a liſt of the barons that were to be pardoned, he found his own ſon John, who was his favourite, among them, he could no longer ſupport his grief. He broke out into the moſt lamentable expreſſions of deſpair; curſed the day in which he received his miſerable being; and beſtowed on his ungrateful children a malediction which he could never afterwards be prevailed upon to retract. Soon after, he fell into a lingering fever occaſioned by his grief; and of this he died on the 6th of July 1189, in the 58th year of his age and 35th of his reign. His natural ſon Geoffrey, who alone had behaved dutifully towards him, attended his corpſe to the nunnery of Fontevrault, where it lay in ſtate in the abbey-church. Next day Richard, who came to viſit the dead body of his father, was ſtruck with horror at the ſight. At his approach, the blood was ſeen to guſh out at the mouth and noſtrils of the corpſe; and this accident was, by the ſuperſtition of the times, interpreted as the moſt dreadful rebuke. Richard could not endure the ſight. He exclaimed that he was his father's murderer; and and expreſſed a ſtrong, though too late, ſenſe of his undutiful conduct.

124 His extreme grief and death.

125 Richard

Richard ſucceeded to the throne without oppoſition, immediately after his father's death; and, on his ac-

acceſſion, ſet his mother Eleanor (who had been again confined) at liberty. A romantic deſire for ſtrange adventures, and an immoderate zeal for the external rites of religion, were the ruling paſſions of the times. By the firſt of theſe Richard was inflamed to the higheſt degree, and therefore behaved as if the whole deſign of his government had been to attempt the recovery of the Holy Land from the Infidels. The ſuperſtition of the people ſhowed itſelf in a moſt violent and tragical manner on the very day of the king's coronation. The Jews were the objects of univerſal hatred, ſo that Richard had iſſued out orders forbidding any of them from appearing at his coronation. But ſome of them bringing him large preſents from their nation, preſumed, notwithſtanding theſe orders, to approach the hall in which the king dined. Being diſcovered, they were expoſed to the inſults and injuries of the byſtanders; in conſequence of which they fled, and were purſued by the people. A report was ſpread, that the king had given orders to maſſacre all the Jews. This ſuppoſed command was executed in the moſt cruel manner. Multitudes were ſlaughtered in the city of London, and this example was followed in moſt of the cities in England. Five hundred Jews had retired into York caſtle for ſafety: but finding themſelves unable to defend the place, they murdered their wives and children; threw the dead bodies over the wall againſt their enemies who attempted to ſcale it; and then, ſetting fire to the houſes, periſhed in the flames. The gentry in the neighbourhood, who were all indebted to the Jews, ran to the cathedral where their bonds were kept, and made a ſolemn bonefire of them before the altar.

126
Maſſacre of the Jews.

127
Richard's preparations for his journey into Paleſtine.

Richard immediately began to take meaſures for his expedition into Paleſtine. His father had left him 100,000 merks; and this ſum he augmented by all expedients he could think of, however pernicious to the public, or dangerous to the royal authority. He ſet up to ſale the revenues and manors of the crown, and ſeveral offices of the greateſt truſt and power. Liberties, charters, caſtles, were given to the beſt bidders. His friends warned him of the danger attending this venality; but he told them he would ſell the city of London itſelf, if he could find a purchaſer. Numerous exactions were alſo practiſed upon all ranks and ſtations; menaces, promiſes, and expoſtulations, were uſed to fright the timid, and allure the avaricious. A zealous preacher of thoſe times was emboldened to remonſtrate againſt the king's conduct; and adviſed him to part with his three daughters, which were pride, avarice, and ſenſuality. To this Richard readily replied, "You counſel right, my friend; and I have already provided huſbands for them all. I will diſpoſe of my pride to the templars; my avarice to the monks; and as for my ſenſuality, the clergy ſhall ſhare that among them." At length the king having got together a ſufficient ſupply for his undertaking, and even ſold his ſuperiority over Scotland for a moderate ſum, ſet out for the Holy Land; whither he was impelled by repeated meſſages from the king of France, who was ready to embark in the ſame enterpriſe.

An account of Richard's exploits in this expedition is given under the articles Egypt, Sicily, Cyprus, &c.—Having at laſt concluded a truce with Saladin, he ſet out on his return for England. He was, however, at a loſs how to proceed. He durſt not return by the way he came, as this would put him in the power of the king of France, between whom and the king of England an irreconcileable enmity had taken place. No way therefore was left, but by going more to the north; for which reaſon he took ſhipping for Italy, but was wrecked near Aquileia. From thence he travelled towards Raguſa, and reſolved to make his way through Germany in the habit of a pilgrim. But his expences and liberalities having betrayed him notwithſtanding this diſguiſe, he was arreſted by Leopold duke of Auſtria, who commanded him to be loaded with ſhackles. This prince had ſerved under Richard at the ſiege of Acres, (the ancient Ptolemais) where; having received ſome diſguſt, he took this baſe method of revenging himſelf. Henry VI. emperor of Germany, was then equally an enemy to Richard on account of his having married Berengaria the daughter of Tancred king of Sicily. He therefore required the royal captive to be delivered up to him, and ſtipulated a large ſum of money to the duke as a reward for his ſervice.

128
Taken priſoner on his return.

The kingdom of England in the mean time was in great confuſion. Richard had left it under the direction of Hugh biſhop of Durham, and Longchamp biſhop of Ely. The tempers of theſe prelates being very different, an animoſity between them ſoon take place. Longchamp at laſt arreſted his colleague, and obliged him to reſign his power in order to obtain his liberty. The king, by many letters, commanded Longchamp to replace his coadjutor, but to no purpoſe. When the ſituation of the king became uncertain, Longchamp tyrannized to ſuch a degree, that John the king's brother thought proper to oppoſe him. He then left the kingdom; and upon this the archbiſhop of Rouen was made juſticiary in his room. The king of France being informed of theſe diſſenſions, ſtrove to increaſe them as much as poſſible; and had even almoſt prevailed upon John to throw off his allegiance, by promiſing to put him in poſſeſſion of all Richard's continental dominions.

129
Treachery of John the king's brother.

When the Engliſh firſt received the news of Richard's captivity, a general indignation was excited through the whole nation. The greateſt, and almoſt the only traitor in the kingdom, was the king's own brother John. On the very firſt invitation from the court of France, he went abroad; and held a conſultation with Philip, the object of which was the perpetual ruin and captivity of his unhappy brother. He promiſed to deliver into Philip's hands a great part of Normandy; and, in return, he received the inveſtiture of all Richard's tranſmarine dominions: it is even ſaid, that he did homage to the French king for the crown of England.

In conſequence of this treaty, Philip invaded Normandy, and made conſiderable progreſs in the conqueſt of it. He was, however, at laſt repulſed by the earl of Leiceſter, who was now returned from the Holy Land; and a truce was concluded on condition of paying the French king 20,000 merks, and putting four caſtles into his hands by way of ſecurity for the payment.—John, who had come over to England, met with ſtill leſs ſucceſs in his enterpriſes. He was only able to make himſelf maſter of the caſtles of Windſor and Wallingford;

ford; but when he came to London, and demanded the kingdom as heir to his brother, of whoſe death he pretended to have received certain intelligence, he was rejected by all the barons, and meaſures were taken to oppoſe and ſubdue him. The defence of the kingdom was ſo well provided for, that John, after ſome fruitleſs efforts, was obliged to conclude a truce with his opponents; and, before the expiration of it, he thought proper to retire to France, where he openly acknowledged his alliance with Philip.

All the efforts of Richard's enemies proved ineffectual to detain him in captivity. He was brought before the diet of the empire at Worms, where the emperor Henry brought againſt him a charge of many crimes and miſdemeanors: but to this the king replied with ſo much ſpirit and eloquence, that the German princes exclaimed loudly againſt the conduct of the emperor; the Pope threatened him with excommunication; and Henry, who had hearkened to the propoſals of the king of France and prince John, found that it would be impoſſible for him to execute his and their baſe purpoſes, and detain the king of England any longer in captivity. He therefore concluded a treaty with him for his ranſom; and agreed to reſtore him to his liberty for 150,000 merks, about L. 300,000 of our money, of which 100,000 merks were to be paid immediately, and 67 hoſtages delivered for the remainder.

130 Richard releaſed from captivity.

The money for the king's ranſom was moſt cheerfully raiſed by the Engliſh. The churches and monaſteries melted down their plate to the amount of 30,000 merks; the biſhops, abbots, and monks, paid a fourth part of their yearly rent; the parochial clergy contributed a tenth part of their tythes; and the requiſite ſum being thus collected, queen Eleanor and Walter archbiſhop of Rouen ſet out with it for Germany, paid the money to the emperor and duke of Auſtria at Mentz, delivered them hoſtages for the remainder, and freed Richard from his captivity. His eſcape was very critical. Henry had been detected in the aſſaſſination of the biſhop of Liege, and in an attempt of the like nature on the duke of Louvaine; and finding himſelf extremely obnoxious to the German princes on account of theſe odious practices, he had determined to ſeek ſupport from an alliance with the French king, and to detain Richard in perpetual captivity, notwithſtanding the ſum he had already received for his ranſom. He therefore gave orders that Richard ſhould be purſued and arreſted; but the king making all imaginable haſte, had already embarked at the mouth of the Schelde, and was out of ſight of land when the emperor's meſſengers reached Antwerp. The king of France no ſooner heard of Richard's deliverance, than he wrote to John his confederate in theſe terms: "Take care of yourſelf: the devil is broke looſe."

131 Returns to England.

The king of England returned from captivity on the 20th of March 1194, and was received with the utmoſt joy by his ſubjects. He had been but one day landed, when his treacherous brother John came to make his ſubmiſſion. At the interceſſion of queen Eleanor he was received into favour. "I forgive him, (ſaid the king), and hope I ſhall as eaſily forget his offences as he will my pardon." Richard was impatient to revenge himſelf on the king of France, and therefore inſtantly made war upon him. But though both kings were inflamed with the moſt violent reſentment againſt each other, they found it impoſſible to engage their powerful barons heartily in their cauſe. The war, therefore, produced no remarkable event; and, in 1195, was concluded by a truce for five years. On ſome ſlight occaſion it was ready to break out anew, when the pope's legate interpoſed, and a treaty was about to be concluded. King Richard in the mean time was wounded by an arrow at the ſiege of Chalus, a caſtle of Limoges. The wound was not in itſelf dangerous; but being unſkilfully treated, a mortification enſued, and the king expired on the 6th of April 1199, in the 10th year of his reign and 42d of his age. By his will he left the kingdom to his brother John, but diſtributed a fourth part of his treaſure among his ſervants.

132 His death.

133 John ſucceeds to the crown.

John ſucceeded to the crown of England without oppoſition, but ſoon found his affairs embarraſſed on the continent. The king of France, who, during the life of king Richard, had always ſupported the pretenſions of John, now gave a like ſupport to the claims of prince Arthur the ſon of Geoffrey, who, though only 12 years of age, promiſed to be deſerving of the kingdom. But in this matter the king of France ſhewed ſo much regard to his own intereſt, that Conſtantia the mother of the young prince, thinking that her ally deſigned to keep for himſelf the provinces which he pretended to conquer for Arthur, ſubmitted herſelf and her ſon to John, who detained them in Mans; and thus became undiſputed maſter of the whole Britiſh empire.

134 His bad qualities.

The new king was weak, tyrannical, cruel, and treacherous. In ſhort, he ſeemed to be endowed with almoſt every bad quality that can fall to the ſhare of man. His conduct, therefore, ſoon rendered him univerſally odious. Imagining himſelf now ſecure on the ſide of France, he indulged his paſſion for Iſabella the daughter and heireſs of the count of Angouleme, with whom he was much enamoured. His queen, the heireſs of the family of Gloceſter, was ſtill alive; and Iſabella was married to the count de la Marche, tho', by reaſon of her youth, the marriage had not been conſummated. John perſuaded the count de Angouleme to carry off his daughter from her huſband; at the ſame time that he procured, under ſome pretence or other, a divorce from the queen. Thus he incurred the diſpleaſure of the pope, and alſo of the count de la Marche, and a powerful confederacy was formed againſt him.

As John had neither courage nor policy ſufficient to keep his barons in awe, he took a method for that purpoſe equally baſe and cruel. This was by hiring a ſet of ruffians, whom he called his *champions*, to fight duels with them, in caſes where they required to clear themſelves from any charge by fighting a duel, according to the cuſtom of thoſe times. Thus he propoſed to get rid of his refractory barons; but they, deſpiſing opponents who were ſo far below their rank, refuſed to fight with them, and a dangerous combination was formed among the barons againſt him.

135 Murders his nephew.

The murder of prince Arthur rendered John ſtill more generally deteſted. The young prince with his mother had fled to the court of France, where they were received with the greateſt kindneſs, and found their intereſts more vigorouſly ſupported than before. Their enterpriſes were attended with conſiderable ſucceſs, when Arthur himſelf had the misfortune to be taken priſoner. All the other captives were ſent to England; but the prince was ſhut up in the caſtle of Falaiſe, and from that time was never heard of. It was univerſally believed that John had murdered him with his own hand; and this inflamed the general reſentment againſt him to ſuch a degree, that he ſoon after loſt all his French provinces. In 1205, the duchy of Normandy itſelf was alſo conquered by Philip, and John was forced to fly with diſgrace to England.

The king was reſolved to wreak his vengeance upon the barons, who, he pretended, had deſerted his ſtandard in Normandy. For this reaſon, he levied large ſums on their eſtates; in order, as he ſaid, to undertake an expedition to the continent. This expedition, however, he ſeveral times capriciouſly deferred; and once having ventured out to ſea, returned again without making the ſmalleſt attempt. At laſt, he landed at Rochelle, and burnt the city of Angers; but hearing that the enemy were preparing to oppoſe him, he returned without attempting any thing elſe.

136 His conteſt with the pope.

137 The kingdom laid under an interdict.

This irreſolute and cowardly behaviour of John made him contemptible in the eyes of his ſubjects; but the Norman princes had ſo far extended the prerogatives of the Engliſh crown, that the barons, however diſcontented, durſt not yet attempt to change the form of government. John, by entering into a controverſy with the church, completed his ruin. The clergy, who for ſome time had acted as a community totally independent of the civil power, had their elections of each other generally confirmed by the pope, to whom alone they owned ſubjection. The election of archbiſhops, however, had been a ſubject of continual diſpute between the ſuffragan biſhops and the Auguſtine monks. In the mean time the archbiſhop of Canterbury died; and the Auguſtine monks, in a very private manner, elected Reginald, their ſuperior, in his place. The biſhops exclaimed againſt this election, as a manifeſt innovation of their privileges; and a furious theological conteſt was likely to enſue. John very imprudently took a ſide in this controverſy, and eſpouſed the cauſe of the ſuffragan biſhops; in conſequence of which, John de Grey biſhop of Norwich was choſen. The cauſe was appealed to Rome; and pope Innocent III. ſeizing with avidity an opportunity of extending his power, commanded the monks to chooſe cardinal Stephen Langton, an Engliſhman, then at the court of Rome. The being able to nominate an archbiſhop of Canterbury, (a perſon of almoſt equal authority with the king) was an acquiſition that would effectually give the court of Rome an unlimited authority over England. John therefore was reſolved not to ſubmit to this impoſition; but he had not judgment ſufficient to conduct him. He violently expelled the monks from their convent, and ſeized upon their revenues. The pope, perceiving from this abſurd conduct, that John was unequal to the taſk he had undertaken, after ſome intreaties, threatened to put the whole kingdom under an interdict. The prelates threw themſelves on their knees before the king, and in the moſt earneſt manner intreated him to avoid the reſentment of the holy tribunal, by receiving the primate, and reſtoring the monks to their convent. John, however, broke out into the moſt violent invectives. He ſwore by *God's teeth*, (his uſual oath), that if the kingdom was put under an interdict, he would baniſh the whole body of the clergy, and confiſcate all their poſſeſſions. The pope at laſt, finding he might do it with ſafety, iſſued forth this terrible ſentence ſo much dreaded by the whole nation. A ſtop was immediately put to divine ſervice, and the adminiſtration of all the ſacraments except baptiſm. The church-doors were ſhut, and the images of the ſaints laid on the ground. The dead were refuſed Chriſtian burial; and were thrown into ditches and on the highways, without any funeral ſolemnity. Marriage was celebrated in the church-yards, and the people prohibited the uſe of meat as in times of public penance. They were debarred from all pleaſure; even from ſhaving their beards, ſaluting each other, or paying any regard to their apparel. The clergy deplored the unhappy ſtate of the nation in the moſt lamentable manner; while John, in revenge, impriſoned all their concubines, and treated the adherents of Langton with the utmoſt rigour.

138 The king excommunicated, and the kingdom given to Philip of France.

The furious and imprudent efforts of John proved totally ineffectual. He had ſcarce a friend left in the whole nation; and therefore, in 1209, the pope denounced a ſentence of excommunication againſt himſelf. This was ſoon followed by another ſtill more terrible; namely, the abſolving all the ſubjects of the king of England from their allegiance, and declaring every one to be excommunicated who had any commerce with him at his table, council, or even in private converſation. The king, rendered quite furious by theſe repeated indignities, wreaked his vengeance on his unhappy ſubjects, whoſe affections he ought rather to have attempted to conciliate. The pope, therefore, proceeded to execute the full meaſure of his wrath on this devoted prince, by giving away his kingdom to Philip of France. He publiſhed a cruſade all over Europe againſt king John; exhorting the nobility, the knights, and men of every condition, to take up arms againſt him, and enliſt under the French banner. Philip was not leſs active on his part. He ſummoned all the vaſſals of the crown to attend him at Rouen; and having collected a fleet of 1700 veſſels, was ready, in 1213, to invade England.

The pope had now overſtretched his power; and had the Engliſh nation been governed by a prince of any degree of prudence or reſolution, the power of the clergy would in all probability have been totally broken. The people, however ſuperſtitious and ready to obey in matters of religion, could not tamely ſubmit to be given away by the pope as ſlaves from one maſter to another; and therefore this conſideration, added to the natural antipathy ſubſiſting between the French and Engliſh, put John, notwithſtanding all his offences, at the head of an army of 60,000 men. But the pope was too great a politician to ſuffer matters to be carried to extremities. He promiſed himſelf many more advantages from the ſubmiſſion of John, than from an alliance with Philip; and therefore came over in perſon, or, according to ſome, ſent over his legate, to England, under pretence of conferring with the barons, but in reality to hold a conference with John. He there repreſented to this forlorn prince, the numbers of the enemy, the hatred of his own ſubjects, and the ſecret confederacy there was againſt him in England. He intimated, that there was but one way to ſecure him from the impending danger; namely, to put himſelf under the protection of the pope, who was a merciful father, and ſtill willing to receive a repenting ſinner. The abject and irreſolute ſpirit of John ſubmitted to this laſt piece of arrogance, and he took an oath to obey whatever the pope ſhould command. In conſequence of this oath, he took another, the moſt extraordinary mentioned in the records of hiſtory; and which, as it was taken while he commanded an army of 60,000 men, diſcovers a meanneſs of ſpirit almoſt incredible.

139 John's ſubmiſſion to the pope.

The terms impoſed by it were expreſſed in the following words. "I John, by the grace of God king of England and lord of Ireland, in order to expiate my ſins, from my own free will, and the advice of my barons, *give* to the church of Rome, to pope Innocent and his ſucceſſors, the kingdom of England, and all other prerogatives of my crown. I will hereafter hold them as the pope's vaſſal. I will be faithful to God, to the church of Rome, to the pope *my maſter*, and his ſucceſſors legitimately elected. I promiſe to pay him a tribute of 1000 merks; to wit, 700 for the kingdom of England, and 300 for the kingdom of Ireland."

This oath was taken by the king before all the people, kneeling, and with his hands held up between thoſe of the legate. Having then agreed to reinſtate Langton in the primacy, he received the crown which he had been ſuppoſed to have forfeited; while the legate, to add to his former inſolence, trampled under his feet the tribute which John had conſented to pay.—The king of France was enraged at this behaviour of the pope; and reſolved to execute his project of conquering England, in ſpite of him and all his cenſures. His fleet, however, was attacked in their harbours by the Engliſh, who took 300 veſſels, and deſtroyed about 100 more; while Philip, finding it impoſſible to prevent the reſt from falling into the hands of the enemy, ſet fire to them himſelf, and thus was obliged to give up all hopes of ſucceſs.

140 The barons attempt to reduce the prerogatives of the crown.

John being thus freed from all danger, continued to follow the ſame cruel and tyrannical meaſures which had hitherto rendered him odious to his ſubjects. His ſcandalous ſubjection to the clergy, now gave the barons an opportunity of exerting themſelves, in order to reduce the enormous prerogatives of the crown. Their deſigns were greatly facilitated by the concurrence of Langton the primate, who on all occaſions ſhewed a ſincere regard for the intereſts of the kingdom. At a ſynod of his prelates and clergy, convened in St Paul's, on pretence of examining into the loſſes of ſome biſhops who had been exiled by John, he privately conferred with a number of barons, to whom he expatiated upon the vices and injuſtice of their ſovereign. He ſhewed them a copy of Henry the firſt's charter; (being the only one in the kingdom, and which had been buried in the rubbiſh of an obſcure monaſtery). Langton exhorted the barons to inſiſt on a renewal of it, and this they ſolemnly ſwore to perform. The ſame agreement was afterwards renewed at a more numerous meeting of barons ſummoned by Langton at St Edmondſbury. Here it was reſolved, that at Chriſtmas they would prefer their common petition in a body; and in the mean time they ſeparated with a deſign to put themſelves in a poſture of defence, enliſt men, and fortify their caſtles. In the beginning of January 1215, they repaired to London, accoutred in their military garb and equipage, and preſented their petition to the king, alleging that he had promiſed to grant a confirmation of the laws of Edward the Confeſſor, at the time he was abſolved from his excommunication. John reſented their preſumption; and required a promiſe under their hands and ſeals, that they would never demand, or attempt to extort, ſuch privileges for the future. This they refuſed with ſuch unanimity and reſolution, that the king deſired time to conſider of their demands. He promiſed, that, at the feſtival of Eaſter, he would give a poſitive anſwer to their petition; and offered them the archbiſhop of Canterbury, the biſhop of Ely, and the earl mareſchal, as ſureties for fulfilling his engagements.

The barons accepted of his ſecurities, and departed peaceably; but John had no deſign of complying with their deſires. He had recourſe to the clergy, whoſe power he had ſeen and felt in ſo many inſtances. He courted their favour, by granting them a charter eſtabliſhing all thoſe rights of which they were already in the poſſeſſion, and which he now pretended to confirm when he had not the liberty to refuſe. To ingratiate himſelf ſtill farther with this body, he took the croſs, and appealed to the pope againſt the uſurpation of the barons. The pope wrote letters to England, reproaching the primate and biſhops with favouring theſe diſſenſions; and commanded them to promote peace between the two parties. He exhorted the barons to conciliate the king, not with menaces, but with humble intreaties; and promiſed, upon their obedience, to interpoſe his own authority in favour of ſuch of their petitions as he ſhould find to be juſt. At the ſame time he annulled their aſſociation, and forbad them to enter into any confederacy for the future.

The barons paid no regard to the pope's remonſtrances; knowing that the fulminations of the court of Rome would be of little avail, unleſs they were ſeconded by the clergy of England. After waiting till Eaſter, when the king promiſed to return them an anſwer, they met by agreement at Stamford. There they aſſembled a force of above 2000 knights, and a prodigious number of foot. Thence they marched to Brackley, about 15 miles from Oxford, the place where the court then reſided. John, hearing of their approach, ſent the archbiſhop of Canterbury, the earl of Pembroke, and others of his council, to know the particulars of their requeſt, and what thoſe liberties were which they ſo much importuned him to grant. The barons delivered a ſchedule containing the chief articles of their demands, founded on the charters of Henry and Edward; but which were in the higheſt degree diſpleaſing to the king. He burſt into a furious paſſion, aſked the barons why they did not alſo demand his kingdom, and ſwore that he would never comply with ſuch exorbitant demands. The confederates then choſe Robert Fitzwalter for their general; whom they dignified with the title of "Mareſchal of the army of God and of the holy church." They laid ſiege to Northampton, took Bedford, and were joyfully received into London. They wrote letters to all the nobility and gentry who had not yet declared in their favour, threatening their eſtates with devaſtation in caſe of refuſal or delay.

In the mean time the king was left at a place called *Odiham* in Surrey, attended only by ſeven knights. He vainly endeavoured to avert the ſtorm by the mediation of his biſhops and miniſters. He appealed to Langton againſt the barons, not ſuſpecting that he was engaged in the confederacy; and deſired him to fulminate the church-cenſures againſt thoſe who had made war upon their lawful prince. Langton declared that he would paſs no cenſure where he found no delinquent; but ſaid, that much might be done if the king would diſmiſs ſome foreign auxiliaries which he had lately brought over. Upon this John diſbanded a great body of Germans and Flemings whom he had hitherto retained in his ſervice, and Langton refuſed to excommunicate a ſingle baron. The king, being now quite defenceleſs, was obliged at laſt to comply with the demands of his ſubjects. A conference was accordingly appointed, and all things were adjuſted for this moſt important treaty.

141
They force him to ſign Magna Charta.

The king's commiſſioners met the barons at a place called *Runimede*, between Staines and Windſor; and which is yet held in reverence as the ſpot where the ſtandard of freedom was firſt erected in England. Here the king ſigned the charter called *Magna Charta;* which continues in force to this day, and is ſtill regarded as the great bulwark of Britiſh liberty. See Magna *Charta*.

But tho' John had thus obliged himſelf, by writing, to allow liberty to his ſubjects, he had no mind that they ſhould enjoy it in reality. The ſenſe of his ſubjection to his own vaſſals ſunk deep in his mind. He became ſullen, ſilent, and reſerved. He ſhunned the ſociety of his former friends; and retired into the Iſle of Wight, as if to hide his diſgrace in ſolitude; but, in reality, to meditate revenge againſt the barons. He ſent to the continent to enliſt a large body of mercenary troops, and made complaints to the pope of the inſurrections of the barons againſt him. The pontiff very warmly eſpouſed his cauſe; a bull was ſent over, annulling the whole charter; and at the ſame time the foreign troops arriving, the king once more found himſelf in a condition to demand his own terms from his ſubjects.

142
He raiſes an army againſt them.

The barons had made no preparations for war, not ſuſpecting the introduction of a foreign army. The king, therefore, was for ſome time undiſputed maſter of the field, and the moſt horrid cruelties were committed by his army. The barons being totally unable to raiſe an army capable of contending with that of John, applied to their old enemy Philip of France, offering to acknowledge his eldeſt ſon Lewis for their ſovereign, on condition of his protecting them from the fury of John and his mercenaries. The French king accepted their propoſal with joy; and twenty-five hoſtages which he demanded being ſent over, began to make the moſt diligent preparations for this expedition, regardleſs of the menaces of the pope, who threatened him with excommunication, and actually excommunicated his ſon Lewis ſome time after.

143
The kingdom offered to Lewis the French king's ſon.

The firſt troops who came to the aſſiſtance of the barons, were only a body of 7000 men; but, ſoon after, Lewis with a powerful army landed at Sandwich. The firſt effect of this invaſion was, that moſt of John's foreign troops deſerted, refuſing to ſerve againſt the heir of their monarchy. Many conſiderable noblemen alſo deſerted his cauſe, and Lewis daily gained ground. This prince advanced to London, where the barons and burghers did him homage, and took the oath of allegiance, after he had ſworn to confirm the liberties and privileges of the people. His imprudence, however, in preferring on all occaſions his French ſubjects to the Engliſh, ſoon excited a jealouſy againſt him, which proved very prejudicial to his cauſe. This jealouſy was greatly increaſed by the death-bed confeſſion of the count de Melun, one of his courtiers, who declared to thoſe about him, that it was Lewis's deſign to exterminate the Engliſh barons as traitors, and to beſtow their dignities and eſtates upon his French ſubjects, on whoſe fidelity he could more ſafely rely. This cauſed a conſiderable deſertion among Lewis's party; ſo that John once more found himſelf in a condition to make an effort for his crown. He reſolved to penetrate into the heart of the kingdom; and, for this purpoſe, he departed from Lynn, and took the road towards Lincolnſhire at the head of a great body of troops. His road lay along the ſhore, which was overflowed at high water; but the king, not being appriſed of this, or being ignorant of the tides of the place, loſt all his carriages, treaſure, and baggage by their influx. He himſelf eſcaped with the utmoſt difficulty, and arrived at the abbey of Swinſtead; where his grief for the loſs he had ſuſtained, and the diſtracted ſtate of his affairs, threw him into a fever, which ſoon appeared to be attended with fatal ſymptoms. He died at Newark in the year 1216, the 51ſt of his age, and 18th of his reign. He left two legitimate ſons: Henry, who ſucceeded him on the throne, and was now about nine years of age; and Richard, who was about ſeven. He left alſo three daughters; Jane, married to Alexander king of Scotland; Eleanor, married to the earl of Pembroke; and Iſabella, married to the emperor Frederic II.

144
Death of king John.

When John died, the earl of Pembroke was mareſchal of England. By this office he was at the head of the army, and of conſequence, in times of ſuch turbulence, at the head of the ſtate. He was a nobleman of great honour and fidelity, and had continued faithful to John in his greateſt reverſes of fortune. He now determined to ſupport the authority of the infant prince Henry; and therefore carried him immediately to Glouceſter, where the ceremony of coronation was performed, in the preſence of Gualo the legate and a very few noblemen, by the biſhops of Wincheſter and Bath. The young prince was obliged to ſwear fealty to the pope, and renew the homage which his father had done for the kingdom; after which the earl of Pembroke was choſen protector.

145
Henry II.

Till the king arrived at the years of maturity, the tranſactions of his reign can only be conſidered as the conſequences of the diſpoſition of his tutors. Pembroke cauſed him grant a new charter of liberties, conſiſting of the conceſſions extorted from John, with ſome alterations; and the next year it was renewed, with the addition of ſome other articles. Thus theſe famous charters were brought very nearly to the ſhape in which they have ever ſince ſtood; and they were, during many generations, eſteemed the moſt ſacred rampart to national liberty and independence. As they ſecured the rights of all orders of men, they were anxiouſly defended by all, and became in a manner the baſis of the Engliſh monarchy, and a kind of original contract,

146
He grants new charters.

contract, which both limited the authority of the king, and enſured the conditional allegiance of his ſubjects. Though often violated, they were ſtill claimed and recalled by the nobility and people; and as no precedents were ſuppoſed valid that infringed them, they rather acquired, than loſt, authority, from the frequent attempts made againſt them, in ſeveral ages, by regal and arbitrary power.

Theſe charters were made uſe of by Pembroke as arguments to draw off the malecontent barons from their allegiance to Lewis. He repreſented to them, that, whatever jealouſy they might have entertained againſt the late king, a young prince, the lineal heir of their ancient monarchs had now ſucceeded to the throne, without ſucceeding either to the reſentments or principles of his predeceſſor: That the deſperate expedient, which they had employed, of calling in a foreign potentate, had, happily for them, as well as for the nation, failed of entire ſucceſs; and it was ſtill in their power, by a quick return to their duty, to reſtore the independence of the kingdom, and to ſecure that liberty for which they ſo zealouſly contended: That, as all paſt offences of the barons were now buried in oblivion, they ought, on their part, to forget their complaints againſt their late ſovereign; who, if he had been any wiſe blameable in his conduct, had left to his ſon the ſalutary warning to avoid his paths, which had led to ſuch fatal extremities: And that, having now obtained a charter for their liberties, it was their intereſt to ſhew, by their conduct, that that acquiſition was not incompatible with their allegiance; and that the rights of the king and people, ſo far from being hoſtile and oppoſite, might mutually ſupport and ſuſtain each other.

147
Decline of prince Lewis's party.

Theſe conſiderations, enforced by Pembroke's known character of conſtancy and fidelity, had a very great influence on the barons. Moſt of them began to negociate with him, and many actually returned to their duty. At the ſame time Lewis continued to diſguſt thoſe of his own party by the preference which he viſibly gave to the French. Though he went over to France, therefore, and brought freſh ſuccours from thence, he found that his party was greatly weaker than before, by the deſertion of his Engliſh confederates; and that the death of king John had, contrary to his expectations, occaſioned the total ruin of his affairs. In a ſhort time Pembroke was ſo much ſtrengthened by deſerters from Lewis's party, that he ventured to inveſt Mount-Sorel; though upon the approach of the count de Perche with the French army, he deſiſted from that enterpriſe. The French general immediately marched to Lincoln; and, being admitted into the town, laid ſiege to the caſtle, and ſoon reduced it to extremity. Pembroke ſummoned his forces from every quarter, in order to relieve this important place; and he appeared ſo much ſuperior to the French, that they ſhut themſelves up within the city, reſolving to take ſhelter there. But the garriſon of the caſtle having received a ſtrong reinforcement, made a vigorous ſally upon the beſiegers, while the Engliſh army aſſaulted them from without. The French army was totally routed; the count de Perche with only two perſons more were killed; but many of the chief commanders, and about 400 knights, were made priſoners. On the news of this fatal event, Lewis raiſed the ſiege of Dover, and retired to London; where he received intelligence of a new diſaſter, which put an end to all his hopes. A French fleet, which carried a ſtrong reinforcement, had appeared on the coaſt of Kent; where they were attacked and repulſed with conſiderable loſs, by Philip D'Albiney. He is ſaid to have gained the victory by the following ſtratagem. Having got the wind of the French, he came down upon them with violence; and throwing on their faces a great quantity of quicklime, which he purpoſely carried on board, they were ſo blinded that they were diſabled from defending themſelves. This misfortune ſo diſcouraged the barons who yet adhered to Lewis, that they haſted from every quarter to make their ſubmiſſion to Pembroke; and Lewis himſelf, finding his affairs totally deſperate, was glad to make his eſcape from a country where every thing was become hoſtile to him. He therefore concluded a peace with the Protector; promiſed to evacuate the kingdom; and only ſtipulated in return, an indemnity to his adherents, and a reſtitution of their honours and fortunes, together with the free and equal enjoyment of thoſe liberties which had been granted to the reſt of the nation.

148
He leaves the kingdom.

When the king grew up, he was found to be very unfit for the government of ſuch a turbulent people as the Engliſh at that time were. Though his temper was mild and humane, he was alſo very weak, fickle, and irreſolute. He diſguſted the people by the careſſes he beſtowed on foreigners; and this diſguſt roſe once to ſuch a height, that the barons refuſed to aſſemble in the general council of the nation, or parliament, at his deſire. When commanded to do ſo, they ſent a meſſage to Henry, deſiring him to diſmiſs his foreigners; otherwiſe they would drive both him and them out of the kingdom, and put the crown on the head of one who was more worthy to wear it. The facility of Henry's temper alſo induced him to heap riches upon his foreign favourites in a manner which he could by no means afford: this often brought him into very great ſtraits; and to relieve himſelf, he was obliged to have recourſe to many arbitrary meaſures, which he would not otherwiſe have choſen. Nothing, however, of very great moment happened till the year 1255, when the Pope found means to embark Henry in a ſcheme for the conqueſt of Naples, or Sicily on this ſide the Fare, as it was called; an enterprize which not only brought much diſhonour on the king, but involved him for ſome years in very great expence and trouble. The court of Rome ſome time before had reduced the kingdom of Sicily to the ſame ſtate of feudal vaſſalage which ſhe pretended to exerciſe over England; but Mainfroy, an uſurper, under pretence of governing the kingdom for the lawful heir, had ſeized the crown, and was reſolved to reject the Pope's authority. As the Pope found that his own force alone was not ſufficient to gain his point, he had recourſe to Richard the king of England's brother, who had been created earl of Cornwall, and had ſuch talents for amaſſing money, that he was reckoned the richeſt prince in Chriſtendom. To him the Pope offered the kingdom of Sicily, upon the ſingle condition of his conquering it from the uſurper. Richard was too wiſe to accept this offer; upon which the Pope applied to Henry, and offered him the crown of Sicily for his ſecond ſon Edmund. Henry, dazzled by this propoſal,

149
The pope undertakes the conqueſt of Sicily for Henry's ſon.

ſal, without reflecting on the conſequences, or without conſulting his brother or the parliament, gave the Pope unlimited credit to expend whatever ſums he thought neceſſary for completing the conqueſt of Sicily. The conſequence of this was, that Henry ſoon found himſelf involved in a debt of above 100,000 merks; and tho' greatly mortified at the largeneſs of the ſum, he was ſtill more ſo at the little proſpect he had of ſucceeding in his enterprize; but, fearing the Pope's diſpleaſure, he was obliged to call a parliament, in order to procure a ſupply.

The barons were greatly offended; and, inſtead of ſupplies, anſwered the king only with expoſtulations. The parliament was therefore diſſolved, and a new one called, but with as little ſucceſs as before. Henry was now reduced to go about among ſuch of his ſubjects as were firmly attached to him, and beg aſſiſtance from them at their own houſes. At length his barons, perceiving the exigencies to which he was reduced, ſeemed willing to afford him aid; and, upon his promiſing to grant them a plenary redreſs of grievances, a very liberal ſupply was obtained, for which he renewed their charter with more than uſual ſolemnity. All the prelates and abbots were aſſembled with burning tapers in their hands; the magna charta was read in their preſence; and they denounced ſentence of excommunication upon all who ſhould infringe upon its deciſions. They then put out their tapers on the ground, and exclaimed, “ May every ſoul that proves falſe to this agreement ſo ſtink and corrupt in hell.” The king ſubjoined, “ So help me God, I will inviolably keep all theſe things, as I am a man, as I am a Chriſtian, as I am a knight, and as I am a king crowned and anointed.”

150
Henry ſolemnly renews Magna Charta.

151
He breaks his engagements, which occaſions a revolution.

No ſooner had the king received the ſupplies of which he ſtood ſo much in need, than he forgot all his engagements, put his confidence entirely in foreign counſellors, and evaded or broke thro' in numberleſs inſtances the charters he had given. This conduct rendered him ſo obnoxious to the barons, that Simon Mountfort earl of Lieceſter, a man of a very violent and ambitious temper, determined to attempt an innovation in the government. He formed a powerful confederacy againſt the king, and the deſigns of the conſpirators were effectually put in execution in the year 1258. Henry had ſummoned a parliament in expectation of receiving ſupplies for his Sicilian project; when the barons appeared in the hall, clad in complete armour, with their ſwords by their ſides. The king, ſtruck with this unuſual appearance, aſked them what was their purpoſe, and whether they pretended to make him their priſoner. Roger Bigod, earl Mareſchal, anſwered in name of the reſt, that he was not their priſoner; that they even intended to grant him large ſupplies, in order to fix his ſon on the throne of Sicily; that they only expected ſome return for this expence and ſervice; and that as the king had frequently made ſubmiſſions to the parliament, had acknowledged his paſt errors, and had ſtill allowed himſelf to be carried into the ſame path, which gave them ſuch juſt reaſon of complaint, he muſt now yield to more ſtrict regulations, and confer authority on thoſe who were able and willing to redreſs the public grievances. Henry inſtantly aſſured them of his intentions to grant them all poſſible ſatisfaction; and for that purpoſe ſummoned another parliament at Oxford, to digeſt the new plan of government, and to elect proper perſons who were to be entruſted with the chief authority. This aſſembly, afterwards called the *mad parliament*, went very expeditiouſly to work on the buſineſs of reformation. Twenty-four barons were appointed, with ſupreme authority, to reform the abuſes of the ſtate; and Leiceſter was placed at their head. Their firſt ſtep was to order four knights to be choſen out of each county, who ſhould examine into the ſtate of their reſpective conſtituents, and ſhould attend at the enſuing parliament to give information of their complaints. They ordained that three ſeſſions of parliament ſhould be regularly held every year; that a new high ſheriff ſhould be elected annually; that no wards nor caſtles ſhould be entruſted to foreigners, no new foreſts made, nor the revenues of any counties let to farm.

152
Bad conduct of the new rulers.

Theſe conſtitutions were ſo juſt, that ſome of them remain to this day. But the parliament having once obtained the ſovereign power, took care not to part with it again. They not only protracted the time of their ſitting under various pretences; but at laſt had the effrontery to impoſe an oath upon every individual of the nation, declaring an implicit obedienee to all the ſtatutes executed, or to be yet executed by the barons who were thus appointed as rulers. They not only abridged the authority of the king, but the efficacy of parliament alſo; giving up to 12 perſons the whole parliamentary power between each ſeſſion.--Their uſurpations were firſt oppoſed by the knights of the ſhire, whom they themſelves had appointed. Theſe had for ſome time begun to be regularly aſſembled in a ſeparate houſe, to conſider of the national grievances; the firſt of which was the conduct of the 24 rulers. They repreſented, that though the king had performed all that was required of him, the barons had hitherto done nothing on their part that ſhewed an equal regard for the people; that their own intereſt and power ſeemed the only aim of all their decrees; and they even called upon the king's eldeſt ſon prince Edward to interpoſe his authority, and ſave the ſinking nation.

153
Oppoſed by prince Edward.

The prince was at this time about 22 years of age, and by his active and reſolute conduct had inſpired the nation with great hopes. He told thoſe who made the application to him, that he had ſworn to the late conſtitutions; and, on that account, though they were contrary to his own private opinions, he was reſolved not to infringe them. At the ſame time, however, he ſent a meſſage to the barons, requiring them to bring their undertaking to an end, or otherwiſe to expect the moſt vigorous reſiſtance to their uſurpations. On this the barons were obliged to publiſh a new code of laws, which, though it contained ſcarce any thing material, yet, it was ſuppoſed, would for a while dazzle the eyes of the people, until they could take meaſures to eſtabliſh their authority upon ſurer foundations. In this manner, under various pretences, they continued their power for three years; while the whole nation loudly condemned their treachery, and the Pope himſelf at laſt abſolved the king and his ſubjects from the oath they had taken to obey their injunctions. Soon after this, a parliament was called, and the king reinſtated in his former authority. The barons were obliged to ſubmit for a time; but the earl of Leiceſter having joined the Welſh, who at this time made an irruption into England, the kingdom was reduced to the moſt deplorable ſituation. The puſillanimity of the king prevented any proper or judicious method from being purſued for extricating the people from their diſtreſſes; and at laſt a treaty was concluded with the barons on the moſt diſadvantageous terms that can be imagined. They were reſtored to the ſovereignty of the kingdom, took poſſeſſion of all the royal caſtles and fortreſſes, and even named the officers of the king's houſehold. They ſummoned a parliament to meet at Oxford, in order more fully to ſettle the plan of government; and by this aſſembly it was enacted, that the authority of the 24 barons ſhould continue not only during the life of king Henry, but alſo during that of prince Edward.

154 Who is defeated and taken priſoner, with the king and his brother.

Theſe ſcandalous conditions would have been eaſily complied with by king Henry; but they were utterly rejected by prince Edward, and a civil war immediately enſued. The prince was at firſt ſucceſsful; but, through his impetuoſity, occaſioned the loſs of a great battle, in which his father and uncle were taken priſoners, and he himſelf was obliged ſoon after to ſurrender to the earl of Leiceſter. The king was now reduced to the moſt deplorable ſituation. His partiſans were totally diſarmed, while thoſe of the earl of Leiceſter ſtill kept themſelves in an offenſive poſture. Leiceſter ſeized the eſtates of no fewer than 18 barons; engroſſed to himſelf the ranſom of all the priſoners; monopolized the ſale of wool to foreign markets; and at laſt ordained that all power ſhould be exerciſed by nine perſons, who were to be choſen by three others, or the majority of them; and theſe three were the earl of Leiceſter himſelf, the earl of Glouceſter, and the biſhop of Chicheſter.

155 Firſt houſe of commons.

The miſerable ſituation to which the kingdom was now reduced, proved at laſt the means of ſettling the government on a more proper foundation. Leiceſter, in order to ſecure himſelf, was obliged to have recourſe to an aid, till now, entirely unknown in England, namely, that of the body of the people. He called a parliament, where, beſides the barons of his own party, and ſeveral eccleſiaſtics who were not proper tenants of the crown, he ordered returns to be made of two knights from every ſhire; and alſo deputies from the boroughs, which had been hitherto conſidered as too inconſiderable to be allowed any ſhare in the legiſlation. This parliament was called on the 20th of January 1265: and here we find the firſt outline of an Engliſh houſe of commons; an inſtitution which has ever ſince been conſidered as the bulwark of Britiſh liberty.

The new parliament was far from being ſo compliant to Leiceſter as he had deſired or expected. Many of the barons who had hitherto ſtedfaſtly adhered to his party, were diſguſted with his boundleſs ambition; and the people, who found that a change of maſters was not a change from miſery to happineſs, began to wiſh for the re-eſtabliſhment of royal authority. Leiceſter at laſt, to make a merit of what he could not prevent, releaſed prince Edward from his confinement, and had him introduced at Weſtminſter-hall, where his freedom was confirmed by the unanimous voice of the barons. But though Leiceſter had all the popularity of reſtoring the prince, he was yet politic enough to keep him guarded by his emiſſaries, who watched all his actions. At laſt, however, he found means to make his eſcape in the following manner. The duke of Gloceſter, being diſguſted with Leiceſter, retired from court, and went to his eſtates on the borders of Wales. His antagoniſt purſued him thither; and to give the greater authority to his arms, carried the king and prince of Wales along with him. This furniſhed young Edward with the opportunity he had ſo long deſired. Being furniſhed by the earl of Gloceſter with an horſe of extraordinary ſwiftneſs, he took leave of his attendants, who were in fact his guards, but were not able to come up with him. They purſued him, however, for ſome time; but the appearance of a body of troops belonging to Gloceſter ſoon put an end to their purſuit.

156 Prince Edward recovers his liberty.

The prince no ſooner recovered his liberty, than the royaliſts joined him from all quarters, and an army was ſoon procured which Leiceſter could not withſtand. This nobleman now found himſelf in a remote quarter of the kingdom; ſurrounded by his enemies; and debarred from all communication with his friends by the river Severn, whoſe bridges Edward had broken down. In this extremity, he wrote to his ſon to haſten to his aſſiſtance from London, with a conſiderable army which he had under his command. With this view his ſon advanced to Kenilworth; but here he was ſupriſed, and his army entirely diſperſed, by prince Edward. The young prince, immediately after this victory, advanced againſt Leiceſter himſelf; who, ignorant of the fate of his ſon's army, had paſſed the Severn in boats. He was by no means able to cope with the royaliſts; his men being inferior both in numbers and reſolution to their antagoniſts. His army was defeated with great ſlaughter. Leiceſter himſelf was ſlain, though he called out for quarter, together with his eldeſt ſon Henry, and about 160 knights and other gentlemen. The old king had been purpoſely placed by the rebels in the front of the battle, where he was wounded, and in great danger of being killed; but, crying out, "I am Henry of Wincheſter your king," he was ſaved and put in a place of ſecurity by his ſon, who had flown to his aſſiſtance. The body of Leiceſter being found among the dead, was barbarouſly mangled by one Roger Mortimer; and then ſent to his widow, as a teſtimony of the royal party's barbarity and ſucceſs.

157 Earl of Leiceſter defeated and killed.

This victory, gained at Eveſham, proved deciſive in favour of the royal party. Almoſt all the caſtles, garriſoned by the barons, haſtened to make their ſubmiſſions, and opened their gates to the king. The Iſle of Axholme alone, and that of Ely, truſting to the ſtrength of their ſituation, ventured to make reſiſtance; but were at laſt reduced, as well as the caſtle of Dover, by the valour and activity of prince Edward. Adam de Gourdon, a courageous baron, maintained himſelf ſome time in the foreſts of Hampſhire, committing depredations in the neighbourhood; and obliged the prince to lead a body of troops into that country againſt him. Edward attacked the camp of the rebels; and being tranſported by the ardour of action, leaped over the trench with a few followers, and encountered Gourdon himſelf in ſingle combat. The victory was long diſputed between theſe two valiant combatants; but ended at laſt in the prince's favour, who wounded his antagoniſt, threw him from his horſe, and took him priſoner. He not only granted him his life; but introduced him that very night to the queen at Guildford, procured his pardon, and was ever after faithfully ſerved by him.

158 Death of Henry III.

In 1271, prince Edward, having ſettled the affairs of the kingdom, undertook an expedition to the Holy Land, where he ſignalized himſelf by many acts of valour. The king's health declined viſibly after the departure of his ſon; and at laſt, worn out with cares and the infirmities of age, he expired at St Edmondſbury on the 16th of November 1272, in the 64th year of his age and the 56th of his reign.

159 Edward I.

Prince Edward had reached Sicily in his return from the Holy Land, when he received an account of his father's death; at which he expreſſed much concern. As he knew that England was at that time in a ſtate of perfect tranquillity, he was in no haſte to return, but ſpent near a year in France before he made his appearance in England. He was received by his ſubjects with the utmoſt joy, and crowned at Weſtminſter by Robert archbiſhop of Canterbury on the 19th of Auguſt 1274. He immediately applied himſelf to the correcting of thoſe diſorders which the civil commotions, and weak adminiſtration of his father, had introduced. A ſyſtem of ſtrict juſtice, bordering on ſeverity, was introduced and kept up through the whole of this reign. The Jews were the only part of his ſubjects whom Edward oppreſſed. Many arbitrary taxes were levied upon them; 280 of them were hanged at once for adulterating the coin, the goods of the reſt were confiſcated, and all of them baniſhed the kingdom.

160 Conquers Wales.

In 1276, the king undertook an expedition againſt Lewellyn prince of Wales, who had refuſed to do homage for his crown. The conqueſt of that country was not fully accompliſhed till the year 1283; after which the principality of Wales was annexed to the crown of England, and thenceforth gave a title to the king's eldeſt ſon*.—In 1286, the ſettlement of Wales appeared ſo complete, that the king went abroad in order to make peace between Alfonſo king of Arragon, and Philip le Bel king of France, who had a difference about the kingdom of Sicily. He ſucceeded in his negociations; but, ſtaying abroad three years, he found that many diſorders had been introduced in his abſence. Many inſtances of robbery and violence had broke out in all parts of England; but the corruption of the judges, by which the fountains of juſtice were poiſoned, was of ſtill more dangerous conſequence. Edward, in order to remedy this prevailing abuſe, ſummoned a parliament, and brought the judges to a trial; where all of them except two, who were clergymen, were convicted of this flagrant iniquity, were fined, and depoſed from their office. The amount of the fines levied upon them is of itſelf a ſufficient proof of their guilt, being above 100,000 marks; an immenſe ſum in thoſe days, ſufficient to defray the expences of a war betwixt two great nations. The king afterwards made all the new judges ſwear that they would take no bribes; but the depoſing and fining the old ones was the more effectual remedy.

161 ttempts e conueſt of cotland.

In 1291, king Edward began to meditate the conqueſt of Scotland, which employed him during the reſt of his life; but which, though that kingdom was by him reduced to the greateſt diſtreſs, he was never able to accompliſh*. At the ſame time, he was engaged in expenſive conteſts with France; and theſe multiplied wars and preparations for war, by obliging him to have frequent recourſe to parliamentary ſupplies, became the remote cauſes of great and important changes in the government. The parliament was modelled into the form which has continued ever ſince. As a great part of the property of the kingdom, by the introduction of commerce and improvements in agriculture, was transferred from the barons to the lower claſs of people, ſo their conſent was thought neceſſary for raiſing the ſupplies. For this reaſon, the king iſſued writs to the ſheriffs, enjoining them to ſend to parliament, along with two knights of the ſhire, two deputies from each borough within their county; and theſe provided with ſufficient powers from their conſtituents to grant ſuch demands as they ſhould think reaſonable for the ſafety of the ſtate. The charges of theſe deputies were to be borne by the boroughs which ſent them; and ſo far were they from conſidering this deputation as an honour, that nothing could be more diſpleaſing to any borough than to be thus obliged to ſend a deputy, or to any individual than to be thus choſen. The authority of theſe commoners, however, increaſed through time. Their union gave them weight; and it became cuſtomary among them, in return for the ſupplies which they granted, to prefer petitions to the crown for the redreſs of thoſe grievances under which the nation was ſuppoſed to labour. The more the king's neceſſities increaſed, the more he found it neceſſary to give them an early redreſs; till, from requeſting, the commons proceeded to requiring; and having all the property of the nation, they by degrees began alſo to be poſſeſſed of the power.

162 New models the parliament.

163 Dies, and is ſucceeded by Edward II.

Edward I. died of a dyſentery at Carliſle on the 7th of July 1307, as he was leading a great army into Scotland, againſt the inhabitants of which he had vowed the moſt dreadful vengeance. He was ſucceeded by his ſon Edward II. whom he had charged with his dying breath to proſecute the war againſt Scotland, and never to deſiſt till he had finally ſubdued the kingdom. But the new king was of a very different diſpoſition from his father. The Scots gradually recovered their power; and in 1314 gave the Engliſh ſuch a terrible defeat at Bannockburn, that for many years no ſuperiority of numbers could encourage them to look the Scots in the face. See SCOTLAND.

164 Diſcontents of his ſubjects.

The reign of Edward II. affords no particulars of great moment. Being a prince of a weak underſtanding, though endued with no remarkable bad qualities, his reign was one continued ſeries of quarrels with his turbulent ſubjects. His favourites were the moſt general cauſes of diſcontent. The firſt of theſe was one Piers Gavaſton, the ſon of a Gaſcon knight of ſome diſtinction, who had honourably ſerved the late king, and who, in reward for his ſervices, had obtained an eſtabliſhment for his ſon in the family of the prince of Wales.—To be the favourite of any king whatever, is no doubt in itſelf a ſufficient offence to the reſt of the courtiers. Numberleſs faults were therefore found with Gavaſton by the Engliſh barons. When the king went over to France to eſpouſe the princeſs Iſabella, to whom he had been long contracted, Gavaſton was left guardian of the realm, with more ample powers than had uſually been conferred in ſuch a caſe. But when the queen, who was of an imperious and intriguing ſpirit, arrived, Gavaſton had the misfortune to fall under her diſpleaſure alſo, on account of the aſcendancy he had acquired over the king. A conſpiracy was therefore ſoon formed againſt the favourite; at the head of which were, the queen, and the earl of Lancaſter couſin-german to the king, and the moſt opulent and powerful nobleman in England. The king, unable to reſiſt ſuch a combination, was at laſt obliged to baniſh Gavaſton; but recalled him ſome time after. This was ſufficient to ſpread an alarm over the whole kingdom: a civil war enſued; and the nobility having got Gavaſton into their hands, ſoon freed themſelves of any further apprehenſions from him, by putting him to death.

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* See *Wales*.

* See *Scot- nd.*

After the unfortunate defeat at Bannockburn, king Edward choſe a new favourite named *Hugh Le Deſpenſer*. He was a young man of a noble Engliſh family, ſome merit, and very engaging accompliſhments. His father was a perſon of a much more reſpectable character than the ſon; but the being admitted to a ſhare of king Edward's favour was a ſufficient crime. The king imprudently diſpoſſeſſed ſome lords of their eſtates, in order to beſtow them upon this favourite; and this was a ſufficient pretence for openly attacking both the father and ſon. The earls of Lancaſter and Hereford flew to arms. Sentence was procured from parliament of perpetual exile againſt the two Spenſers, with a forfeiture of all their eſtates. At laſt the king took the field at the head of 30,000 men, and preſſed the earl of Lancaſter ſo cloſely, that he had not time to collect his forces together; and, flying from one place to another, he was at laſt ſtopped in his way towards Scotland, and made priſoner. He was immediately condemned by a court-martial; and executed on an eminence near Pomfret, with circumſtances of the greateſt indignity.

165
Inſurrection againſt him by the queen.

Spenſer now triumphed for ſome time over his enemies; moſt of the forfeitures were ſeized for his uſe, and he is ſaid to have been guilty of many acts of rapine and injuſtice. But he was ſoon oppoſed by a more formidable enemy. Queen Iſabella fled to France, and refuſed to return to England till Spenſer was removed from the royal preſence, and baniſhed the kingdom. Thus ſhe made herſelf popular in England, where Spenſer was univerſally diſliked; and ſhe had the pleaſure of enjoying the company of a young nobleman named *Mortimer*, upon whom ſhe had lately placed her affections. The queen's court, therefore, became a ſanctuary for all the malcontents who were baniſhed their own country, or who choſe to come over. When ſhe thought matters were ripe for her purpoſe, ſhe ſet ſail from Dort harbour, accompanied by 3000 armed men. She landed without oppoſition, on the coaſt of Suffolk, on the 24th of September 1326; and ſhe no ſooner appeared, than there ſeemed to be a general revolt in her favour. The unfortunate king found the ſpirit of diſloyalty ſpread over the whole kingdom. He had placed ſome dependence on the garriſon of Briſtol, which was under the command of the elder Spenſer: but they mutinied againſt their governor; and that unfortunate favourite was delivered up, and condemned by the tumultuous barons to the moſt ignominious death. He was hanged on a gibbet in his armour; his body was cut in pieces and thrown to the dogs; and his head was ſent to Wincheſter, where it was ſet on a pole, and expoſed to the inſults of the populace. Young Spenſer did not long ſurvive his father. He was taken, with ſome others who had followed the fortunes of the wretched king, in an obſcure convent in Wales. The queen had not patience to wait the formality of a trial; but ordered him to be immediately led forth before the inſulting populace, and ſeemed to take a ſavage pleaſure in beholding his diſtreſs. He was executed on a gibbet 50 feet high; his head was ſent to London, where it was received by the citizens with brutal triumph, and fixed on the bridge.

166
Edward depoſed.

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As the new king was only eleven years old when he aſcended the throne, the government was veſted in the hands of his three uncles the dukes of Lancaſter, York, and Glouceſter. The different diſpoſitions of theſe noblemen, it was thought, would cauſe them check the deſigns of each other. Lancaſter was neither popular nor enterpriſing; York was indolent and weak; and Glocester turbulent, popular, and ambitious. Diſcontents firſt aroſe among the common people. They had now acquired a ſhare of liberty ſufficient to inſpire them with a deſire for more, and this deſire was greatly encreaſed by the diſcourſes of one John Ball a ſeditious preacher. He went about the country, and inculcated on his audience, that mankind were all derived from one common ſtock; and that all of them had equal right to liberty and the goods of nature, of which they had been deprived by the ambition of a few inſolent rulers.

Theſe doctrines were greedily ſwallowed by the populace, who were farther inflamed by a new impoſition of three groats a-head upon every perſon in the kingdom above 15 years of age. This had been granted as a ſupply by parliament, and was no doubt neceſſary on account of the many expenſive wars in which the kingdom was engaged; but its apparent injuſtice, in laying no more burden upon the rich than the poor, excited the utmoſt reſentment of the people. The manner, too, of collecting this tax, ſoon furniſhed them with an occaſion of revolt. It began in Eſſex, where a report was induſtriouſly ſpread that the peaſants were to be deſtroyed, their houſes burned, and their farms plundered. A blackſmith, well known by the name of *Wat Tyler*, was the firſt that excited them to arms. The tax-gatherers coming to this man's houſe while he was at work, demanded payment for his daughter. This he refuſed, alleging that ſhe was under the age

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to fall under her diſpleaſure alſo, on account of the aſcendancy he had acquired over the king. A conſpiracy was therefore ſoon formed againſt the favourite; at the head of which were, the queen, and the earl of Lancaſter couſin-german to the king, and the moſt opulent and powerful nobleman in England. The king, unable to reſiſt ſuch a combination, was at laſt obliged to baniſh Gavaſton; but recalled him ſome time after. This was ſufficient to ſpread an alarm over the whole kingdom: a civil war enſued; and the nobility having got Gavaſton into their hands, ſoon freed themſelves of any further apprehenſions from him, by putting him to death.

After the unfortunate defeat at Bannockburn, king Edward choſe a new favourite named *Hugh Le Deſpenſer*. He was a young man of a noble Engliſh family, ſome merit, and very engaging accompliſhments. His father was a perſon of a much more reſpectable character than the ſon; but the being admitted to a ſhare of king Edward's favour was a ſufficient crime. The king imprudently diſpoſſeſſed ſome lords of their eſtates, in order to beſtow them upon this favourite; and this was a ſufficient pretence for openly attacking both the father and ſon. The earls of Lancaſter and Hereford flew to arms. Sentence was procured from parliament of perpetual exile againſt the two Spenſers, with a forfeiture of all their eſtates. At laſt the king took the field at the head of 30,000 men, and preſſed the earl of Lancaſter ſo cloſely, that he had not time to collect his forces together; and, flying from one place to another, he was at laſt ſtopped in his way towards Scotland, and made priſoner. He was immediately condemned by a court-martial; and executed on an eminence near Pomfret, with circumſtances of the greateſt indignity.

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Inſurrection againſt him by the queen.

Spenſer now triumphed for ſome time over his enemies; moſt of the forfeitures were ſeized for his uſe, and he is ſaid to have been guilty of many acts of rapine and injuſtice. But he was ſoon oppoſed by a more formidable enemy. Queen Iſabella fled to France, and refuſed to return to England till Spenſer was removed from the royal preſence, and baniſhed the kingdom. Thus ſhe made herſelf popular in England, where Spenſer was univerſally diſliked; and ſhe had the pleaſure of enjoying the company of a young nobleman named *Mortimer*, upon whom ſhe had lately placed her affections. The queen's court, therefore, became a ſanctuary for all the malcontents who were baniſhed their own country, or who choſe to come over. When ſhe thought matters were ripe for her purpoſe, ſhe ſet ſail from Dort harbour, accompanied by 3000 armed men. She landed without oppoſition, on the coaſt of Suffolk, on the 24th of September 1326; and ſhe no ſooner appeared, than there ſeemed to be a general revolt in her favour. The unfortunate king found the ſpirit of diſloyalty ſpread over the whole kingdom. He had placed ſome dependence on the garriſon of Briſtol, which was under the command of the elder Spenſer: but they mutinied againſt their governor; and that unfortunate favourite was delivered up, and condemned by the tumultuous barons to the moſt ignominious death. He was hanged on a gibbet in his armour; his body was cut in pieces and thrown to the dogs; and his head was ſent to Wincheſter, where it was ſet on a pole, and expoſed to the inſults of the populace. Young Spenſer did not long ſurvive his father. He was taken, with ſome others who had followed the fortunes of the wretched king, in an obſcure convent in Wales. The queen had not patience to wait the formality of a trial; but ordered him to be immediately led forth before the inſulting populace, and ſeemed to take a ſavage pleaſure in beholding his diſtreſs. He was executed on a gibbet 50 feet high; his head was ſent to London, where it was received by the citizens with brutal triumph, and fixed on the bridge.

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He is killed.

The courage, addreſs, and preſence of mind, which the king had diſcovered in quelling ſuch a dangerous tumult, gave great hopes to the nation: but, in proportion as Richard advanced in years, theſe hopes were blaſted; and his want of capacity, or at leaſt of ſolid judgment, appeared in every enterprize he attempted. Weak princes are never without favourites, by whom they are governed; and theſe favourites moſt certainly become obnoxious to the reſt of the courtiers. Richard's firſt favourite was Robert Vere earl of Oxford, and an aſſociation againſt him was ſoon formed by the reſt of the nobility. At the head of it were Mowbray earl of Nottingham, Fitz Alan earl of Arundel, Percy earl of Northumberland, Montacute earl of Saliſbury, and Beauchamp earl of Warwick. Vere was impeached in parliament; and though nothing of moment was even alleged againſt him, he was condemned and deprived of his office. They next proceeded to attack the royal authority itſelf, Under pretence that the king was yet unable to govern the kingdom, tho' at that time 21 years of age, they appointed a commiſſion of 14 perſons to whom the ſovereignty was to be transferred for a year. This meaſure was driven forward by the duke of Gloceſter, and none but his own faction were admitted as members of the committee. The king could not without regret perceive himſelf thus totally deprived of authority. He firſt endeavoured to gain over the parliament to his intereſts, by influencing the ſheriffs of each county, who were then the only returning officers. This meaſure failing, he next applied to the judges. They declared, that the commiſſion which had deprived the king of his authority was unlawful, and that thoſe who procured or adviſed it were puniſhable with death. Their ſentence was quickly oppoſed by declarations from the lords. The duke of Gloceſter armed his partiſans; and appeared at Haringay park near Highgate, at the head of a body of men ſufficient to intimidate the king and all his adherents. Theſe inſurgents, ſenſible of their own power, began by demanding of the king the names of thoſe who had adviſed him to his late raſh meaſures. A few days afterwards they appeared armed in his preſence, and accuſed by name the archbiſhop of York, the duke of Ireland, the earl of Suffolk, and Sir Robert Treſilian, one of the judges who had declared in his favour, together with Sir Nicholas Bember, as public and dangerous enemies to the ſtate. The duke of Ireland fled into Cheſhire, where he attempted to raiſe a body of forces; but was quickly obliged to fly into Flanders, on the arrival of the duke of Gloceſter with a ſuperior army. Soon after, the king was obliged to ſummon a parliament, where an accuſation was drawn up againſt five of his counſellors. Of theſe only Sir Nicholas Bember was preſent; and he was quickly found guilty, condemned, and executed, together with Sir Robert Treſilian, who had been diſcovered and taken during the interval. Lord Beauchamp of Holt was ſoon after condemned and executed; and Sir Simon Burley, who had been appointed the king's governor, ſhared the ſame fate, tho' the queen continued for three hours on her knees before the duke of Gloceſter, imploring his pardon.

174
Cabals and inſolence of the nobles.

Such unparallelled inſolence and barbarity in a ſubject could not go unpuniſhed. In 1389, the king, at an extraordinary council of the nobility aſſembled after Eaſter, to the aſtoniſhment of all preſent, deſired to

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The king takes the power into his own hands.

know his age. Being told that he was turned off two and twenty, he alleged that it was then time for him to govern without help; and that there was no reaſon why he ſhould be deprived of thoſe rights which the meaneſt of his ſubjects enjoyed. The lords anſwered in ſome confuſion, that he had certainly an undiſputed right to take upon himſelf the government of the kingdom. "Yes, (replied the king,) I have long been under the government of tutors; and I will now firſt ſhew my right to power by their removal. He then ordered Thomas Arundel, whom the commiſſioners had lately appointed chancellor, to give up the ſeals; which he next day delivered to William Wickham biſhop of Wincheſter. He next removed the duke of Gloceſter, the earl of Warwic, and other lords of the oppoſition, from the council; and all the great officers of the houſehold, as well as the judges, were changed.

The king being thus left at liberty to govern as he thought proper, for ſome time behaved in ſuch a manner as to gain the affections of the people. It doth not appear indeed that he ever gave much cauſe of complaint; but it was impoſſible for any prince in thoſe days to keep himſelf ſecure on the throne but by a very ſevere and vigorous adminiſtration. The duke of Gloceſter, perceiving that Richard was not of a warlike diſpoſition, frequently ſpoke with contempt of his perſon and government, and deliberated concerning the lawfulneſs of throwing off all allegiance to him. The king being informed of his conduct by ſpies appointed for that purpoſe, at laſt formed a reſolution of ridding himſelf of Gloceſter and his faction at once. He therefore ordered that nobleman to be immediately arreſted and ſent over to Calais, where there was no danger of his being reſcued by his numerous adherents. The earls of Arundel and Warwick were ſeized at the ſame time; and a new parliament, which the king knew would be perfectly obedient to his will, was ſummoned to Weſtminſter. Here the commiſſion of 14, who had uſurped on the royal authority, was annulled for ever; all thoſe acts which had condemned his former miniſters were repealed; and the general pardon which the king had formerly given when he aſſumed the government into his own hands, was revoked. Several of Gloceſter's party were condemned and executed, and at laſt that nobleman himſelf was called for to take his trial as well as the reſt; but he had before been privately diſpatched in priſon.

176
Duke of Gloceſter murdered.

After the deſtruction of the duke of Gloceſter and the heads of his party, a miſunderſtanding aroſe among the noblemen who had joined in the proſecution. The duke of Hereford appeared in parliament, and accuſed the duke of Norfolk of having ſpoken ſeditious words againſt his majeſty in a private converſation. Norfolk denied the charge, gave Hereford the lie, and offered to prove his innocence by ſingle combat. The challenge was accepted; but on the day appointed for the duel, the king would not ſuffer the combatants to engage, but commanded both of them to leave the kingdom. The duke of Norfolk he baniſhed for life, but the duke of Hereford only for ten years. The former retired to Venice, where in a ſhort time he died of a broken heart. Hereford behaved in a reſigned and ſubmiſſive manner; which ſo pleaſed the king, that he conſented to ſhorten the time of his baniſhment four years: he alſo granted him letters patent, enſuring him of the enjoyment of any inheritance which ſhould fall to him during his abſence; but upon the death of his father the duke of Lancaſter, which happened ſhortly after, Richard revoked thoſe letters, and kept the eſtate to himſelf.

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178
Hereford forms a ſcheme of dethroning the king.

This laſt injury inflamed the reſentment of Hereford to ſuch a degree, that he formed a deſign of dethroning the king. He was a great favourite both with the army and people; he was immenſely rich, and connected by blood or alliance with all the great families of the nation. The king, at the ſame time, it is ſaid, gave himſelf up to an idle, effeminate life; and his miniſters following his example, the national honour was loſt. The number of malcontents daily increaſed, and only waited for the abſence of the king, in order to put their ſchemes in execution; and this opportunity ſoon offered.

The earl of March preſumptive heir to the crown, having been appointed the king's lieutenant in Ireland, was ſlain in a ſkirmiſh with the natives of that country; which ſo incenſed Richard, that, unmindful of his precarious ſituation at home, he went over to Ireland with a conſiderable army, in order to revenge his death in perſon. The duke of Lancaſter (for that was the title which Hereford aſſumed on the death of his father) hearing of the king's abſence, inſtantly embarked at Nantz; and with a retinue only of 60 perſons in three ſmall veſſels, landed at Ravenſpur in Yorkſhire. The earl of Northumberland, who had long been a malcontent, together with Henry Percy his ſon, who from his ardent valour was ſurnamed *Hotſpur*, immediately joined him with their forces; and the people flocked to him in ſuch numbers, that in a few days his army amounted to 60,000 men.

Richard, in the mean time, continued in perfect ſecurity in Ireland for ſome time. Contrary winds for three weeks together prevented his receiving any news of the rebellion which was begun in his native dominions. He landed therefore at Milford Haven without ſuſpicion, attended by a body of 20,000 men; but immediately found himſelf oppoſed by a power which he could by no means reſiſt. His army gradually deſerted him, till at laſt he was obliged to acquaint the duke, that he would ſubmit to whatever terms he pleaſed to preſcribe. The duke did not think proper to enter into any treaty with the king; but carried him to London, where he was confined cloſe priſoner in the tower, formally depoſed by parliament, or rather by the duke of Lancaſter, and at laſt put to death. The manner of his death is variouſly related. According to ſome, eight or nine ruffians were ſent to the caſtle of Pomfret, whither the unhappy prince had been removed, in order to diſpatch him. They ruſhed unexpectedly into his apartment; but Richard, knowing their deſign, reſolved to ſell his life as dear as poſſible. He wreſted a pole-ax from one of the murderers, with which he killed four of them; but was at length overpowered and killed. Others relate that he was ſtarved in priſon; and that after he was denied all nouriſhment, he prolonged his life 14 days, by feeding on the flocks of his bed. He died in the year 1399, in the 34th year of his age, and 23d of his reign.—It was during the reign of Richard II. that Wickliff, the noted reformer, publiſhed his doctrines in England. See WICKLIFF.

179
Richard depoſed and murdered.

180
Duke of Lancaſter's claim to the crown.

After ſentence of depoſition had been pronounced on Richard by both houſes of parliament, the throne being then vacant, the duke of Lancaſter ſtepped forth; and having croſſed himſelf on the forehead and on the breaſt, and called on the name of Chriſt, gave in his claim to the throne in the following words, which we ſhall give in the original language. "In the name of Fadher, Son, and Holy Ghoſt, I Henry of Lancaſter, challenge this rewme of Ynglonde, and the croun, with all the membres and the appurtenances; als I that am deſcendit by right line of the blode, coming fro the gude king Henry therde, and throge that right that God of his grace hath ſent me, with help of kyn, and of my frendes to recover it; the which rewme was in poynt to be ondone by defaut of governance, and ondoying of the gude laws."

The right which the duke here claimed by deſcent from Henry III. proceeded on a falſe ſtory that Edmond earl of Lancaſter, ſon of Henry III. was really the elder brother of Edward I.; but that, by reaſon of ſome deformity in his perſon, he had been poſtponed in the ſucceſſion, and Edward the younger brother impoſed on the nation in his ſtead. The preſent duke of Lancaſter inherited from Edmund, by his mother, the right which he now pretended to the crown; though the falſehood of the ſtory was ſo generally known, that he thought proper to mention it only in general terms.—No oppoſition, however, was made to the validity of this title in parliament; and thus commenced the differences between the houſes of York and Lancaſter, which were not terminated but by many bloody and ruinous wars.

180
Henry IV.

The reign of Henry IV. was little elſe than a continued ſeries of inſurrections. In the very firſt parliament he called, no fewer than 40 challenges were given and accepted by different barons; and though Henry had ability and addreſs enough to prevent theſe duels from being fought, it was not in his power to prevent continual inſurrections and combinations againſt himſelf. The moſt formidable one was conducted by the earl of Northumberland, and commenced A. D. 1402. The occaſion of it was, that Henry denied the earl liberty to ranſom ſome Scots priſoners which had been taken in a ſkirmiſh with that nation. The king was deſirous of detaining them in order to increaſe his demands upon Scotland in making peace; but, as the ranſom of priſoners was in that age looked upon as a right belonging to thoſe who had taken them, the earl thought himſelf grievouſly injured. The injury appeared ſtill the greater, becauſe Northumberland conſidered the king as indebted to him both for his life and crown. He reſolved therefore to dethrone Henry; and to raiſe to the throne young Mortimer, who was the true heir to the crown, as being the ſon of Roger Mortimer earl of Marche, whom Richard II. had declared his ſucceſſor. For this purpoſe he entered into an alliance with the Scots and Welſh, who were to make an irruption into England at the ſame time that he himſelf was to raiſe what forces he could in order to join them. But when all things were prepared for this inſurrection, the earl found himſelf unable to lead on the troops, by a ſudden fit of illneſs with which he was ſeized at Berwick. On this, young Piercy (ſurnamed *Hotſpur*) took the command; and marched towards Shrewſbury, in order to join the Welſh. But the king had happily a ſmall army with which he intended to have acted againſt the Scots; and knowing the importance of celerity in civil wars, inſtantly hurried down, that he might give battle to the rebels. He approached Shrewſbury before a junction with the Welſh could be effected; and the impatience of Piercy urged him to an engagement, which at that time he ought to have declined. The evening before the battle, he ſent a maniſeſto to Henry; in which he renounced his allegiance, ſet the king at defiance, and enumerated all the grievances of which he imagined the nation might juſtly complain. He reproached him (and very juſtly) with his perjury; for Henry, on his firſt landing in England, had ſworn upon the goſpels, before the earl of Northumberland, that he had no other intention but to recover poſſeſſion of the duchy of Lancaſter, and that he would ever remain a faithful ſubject to king Richard. He aggravated his guilt, in firſt dethroning and then murdering that prince; and in uſurping on the title of the houſe of Mortimer, to whom, both by lineal ſucceſſion, and by declarations of parliament, the throne, then vacant by Richard's death, did of right belong. Several other heavy charges were brought againſt him; which, at that time, could be productive of no other effect than to irritate the king and his adherents to the utmoſt.

181
Inſurrection of the earl of Northumberland.

182
His ſon defeated and killed at Shrewſbury

The armies on each ſide were in number about 12,000; ſo that they were not unmanageable by their commanders; and as both leaders were men of known bravery, an obſtinate engagement was expected. The battle was fought on the 20th of July 1403; and we can ſcarce find in thoſe ages any other in which the ſhock was ſo terrible and conſtant. At laſt Piercy being killed by an unknown hand, the victory was decided in favour of the royaliſts. There are ſaid to have fallen on that day near 2300 gentlemen, and 6000 private men, of whom near two thirds were of Piercy's army.

The earl of Northumberland having recovered from his ſickneſs, and levied an army, was on his march to join his ſon; but being oppoſed by the earl of Weſtmoreland, and hearing of the defeat at Shrewſbury, he diſmiſſed his forces, and came with a ſmall retinue to the king at York. He pretended that his ſole intention was to mediate between the contending parties; and the king thought proper to accept of his apology, and grant him a pardon for his offence. The other rebels were treated with equal lenity; and none of them, except the earl of Worceſter and Sir Richard Vernon, who were regarded as the chief authors of the inſurrection, periſhed by the hands of the executioner. This lenity, however, was not ſufficient to keep the kingdom quiet; one inſurrection followed another almoſt during the whole of this reign; but either through Henry's vigilance, or the bad management of the conſpirators, they never could unite their forces in ſuch a manner as was neceſſary for bringing their projects to bear.

183
Archbiſhop of York executed.

This reign is remarkable for the firſt capital puniſhment inflicted on a clergyman of high rank. The archbiſhop of York having been concerned in an inſurrection againſt the king, and happening to be taken priſoner, was beheaded without either indictment, trial, or defence; nor was any diſturbance occaſioned by this

184 Burning of heretics introduced.

this ſummary execution. But, the moſt remarkable tranſaction of this reign was, the introduction of that abſurd and cruel practice of burning people on account of their religion. Henry, while a ſubject, was thought to have been very favourable to the doctrines of Wickliffe; but when he came to the throne, finding his poſſeſſion of it very inſecure, he thought ſuperſtition a neceſſary implement of his authority, and therefore determined by all means to pay court to the clergy. There were hitherto no penal laws againſt hereſy; not indeed through the toleration of the court of Rome, but through the ſtupidity of the people, who could not perceive the abſurdities of the eſtabliſhed religion. But when the learning and genius of Wickliffe had once broken the fetters of prejudice, the eccleſiaſtics called aloud for the puniſhment of his diſciples; and Henry, who was very little ſcrupulous in his conduct, reſolved to gratify them. He engaged parliament to paſs a law for this purpoſe: it was enacted, that when any heretic, who relapſed, or refuſed to abjure his opinions, was delivered over to the ſecular arm by the biſhop or his commiſſaries, he ſhould be committed to the flames before the whole people. This weapon did not remain long unemployed in the hands of the clergy. William Sautré, rector of St Oſithes in London, had been condemned by the convocation of Canterbury; his ſentence was ratified by the houſe of Peers; the king iſſued his writ for the execution; and the unhappy man was burnt alive in the year 1401. The doctrines of Wickliffe, however, ſeem to have already gained ground very conſiderably in England. In 1405, the commons, who had been required to grant ſupplies, propoſed in plain terms to the king to ſeize all the temporalities of the church, and employ them as a perpetual fund to ſerve the exigencies of the ſtate. They inſiſted that the clergy poſſeſſed a third of the lands of the kingdom; that they contributed nothing to the public burdens; and that their exorbitant riches tended only to diſqualify them from performing their miniſterial functions with proper zeal and attention. When this addreſs was preſented, the archbiſhop of Canterbury, who then attended the king, objected that the clergy, tho' they went not in perſon to the wars, ſent their vaſſals and tenants in all caſes of neceſſity; while at the ſame time, they themſelves who ſtaid at home were employed night and day in offering up their prayers for the happineſs and proſperity of the ſtate. The ſpeaker anſwered with a ſmile, that he thought the prayers of the church but a very ſlender ſupply. The archbiſhop, however, prevailed in the diſpute; the king diſcouraged the application of the commons; and the lords rejected the bill which the lower houſe had framed for deſpoiling the church of her revenues. The commons were not diſcouraged by this repulſe. In 1410, they returned to the charge with more zeal than before. They made a calculation of all the eccleſiaſtical revenues, which, by their account, amounted to 485,000 merks a-year, and included 18,400 ploughs of land. They propoſed to divide this property among 15 new earls, 1500 knights, 6000 eſquires, and 100 hoſpitals; beſides 20,000 pounds a-year, which the king might keep for his own uſe: and they inſiſted that the clerical functions would be better performed than at preſent, by 15,000 pariſh-prieſts, at the rate of 7 merks a-piece of yearly ſtipend. This application was accompanied with an addreſs for mitigating the ſtatutes enacted againſt the Wickliffites or Lollards, ſo that the king knew very well from what ſource it came. He gave the commons, however, a ſevere reply; and further to ſatiſfy the church that he was in earneſt, ordered a Lollard to be burnt before the diſſolution of parliament.

185 Henry V.

The king had been for ſome time ſubject to fits, which continued to increaſe, and gradually brought him to his end. He expired at Weſtminſter in 1413, in the 46th year of his age, and the 13th of his reign. He was ſucceeded by his ſon Henry V. whoſe martial talents and character had at firſt occaſioned unreaſonable jealouſies in the mind of his father, ſo that he thought proper to exclude him from all ſhare of public buſineſs. The active ſpirit of Henry being thus reſtrained from its proper exerciſe, broke out in every kind of extravagance and diſſipation. It is even reported, that, when heated with liquor, he ſcrupled not to accompany his riotous aſſociates in attacking the paſſengers on the ſtreets and highways, and robbing them of their goods. No ſooner, however, did he aſcend the throne, than he called together his former companions, acquainted them with his intended reformation, exhorted them to imitate his example; but ſtrictly prohibited them, till they had given proofs of their ſincerity in this particular, to appear any more in his preſence: after which, he diſmiſſed them with liberal preſents. His father's wiſe miniſters, who had checked his riots, found that they had, unknown to themſelves, been paying the higheſt court to their ſovereign; and were received with all the marks of favour and confidence. The chief juſtice, who had formerly impriſoned the prince himſelf, and therefore trembled to approach the royal preſence, met with praiſes inſtead of reproaches for his paſt conduct, and was exhorted to perſevere in the ſame rigorous and impartial execution of the laws. The king was not only anxious to repair his own miſconduct, but alſo to make amends for theſe iniquities into which policy or neceſſity of affairs had betrayed his father. He expreſſed the deepeſt ſorrow for the fate of the unhappy king Richard, and even performed his funeral obſequies with pomp and ſolemnity, and heaped favours upon all thoſe who had ſhewn themſelves attached to him. He took into favour the young earl of March, though his competitor for the throne; and gained ſo far on his gentle and unambitious nature, that he remained ever after ſincerely attached to him. The family of Piercy was reſtored to its fortune and honours; and the king ſeemed deſirous to bury all diſtinctions in oblivion. Men of merit were preferred, whatever party they had been of; all men were unanimous in their attachment to Henry; and the defects of his title were forgot amidſt the perſonal regard which was univerſally paid him.

186 Enforces the laws againſt heretics.

The only party which Henry was not able to overcome was the new ſect of Lollards, or reformers of religion. Theſe were now gaining ſuch ground in England, that the Romiſh clergy were greatly alarmed, and Henry was determined to execute the laws upon them. The head of that party at preſent was Sir John Oldcaſtle, Lord Cobham; a nobleman who had diſtinguiſhed himſelf by his valour and military talents on many occaſions, and acquired the eſteem both of the late and preſent king. His high character and zeal for the new ſect pointed him out to Arundel archbiſhop of Canterbury as a proper object of eccleſiaſtical fury, and therefore he applied to Henry for permiſſion to indict him. The king deſired him firſt to try gentle methods, and undertook to converſe with lord Cobham himſelf upon religious ſubjects. He did ſo, but could not prevail, and therefore abandoned Cobham to his enemies. He was immediately condemned to the flames: but having found means to make his eſcape, he raiſed an inſurrection; which was ſoon ſuppreſſed, without any other conſequence than that of bringing a ſtain on the ſect to which he belonged. Cobham himſelf made his eſcape, but four years afterwards was taken and executed as a traitor. Immediately after, the moſt ſevere laws were enacted againſt the Lollards. It was enacted, that whoever was convicted of Lollardy, beſides ſuffering capital puniſhment according to the laws formerly eſtabliſhed, ſhould alſo forfeit his lands and goods to the king; and that the chancellor, treaſurer, juſtices of the two benches, ſheriffs, juſtices of the peace, and all the chief magiſtrates in every city and borough, ſhould take an oath to uſe their utmoſt endeavours for the extirpation of hereſy.

Notwithſtanding theſe terrible laws, the very parliament which enacted them, namely that of 1414, when the king demanded a ſupply, renewed the offer formerly preſſed upon Henry IV. and intreated the king to ſeize all the eccleſiaſtical revenues, and convert them to the uſe of the crown. The clergy were greatly alarmed. They could offer the king nothing of equal value. They agreed, however, to confer on him all the priories alien, which depended on capital abbeys in Normandy, and which had been bequeathed to them when that province was united to England. The moſt effectual method, however, of warding off the blow at preſent was by perſuading the king to undertake a war with France, in order to recover the provinces in that kingdom which had formerly belonged to England. This was agreeable to the dying injunction of Henry IV. He adviſed his ſon never to let the Engliſh remain long in peace, which was apt to breed inteſtine commotions; but to employ them in foreign expeditions, by which the prince might acquire honour, the nobility in ſharing his dangers might attach themſelves to his perſon, and all the reſtleſs ſpirits find occupation for their inquietude. The natural diſpoſition of Henry ſufficiently inclined him to follow this advice, and the civil diſorders of France gave him the faireſt proſpect of ſucceſs. Accordingly, in 1415, the king invaded France at the head of 30,000 men. The great progreſs he made there is related at length under the article FRANCE. He had eſpouſed the king's daughter, and conquered the greateſt part of the kingdom. His queen was delivered of a ſon named *Henry*, whoſe birth was celebrated by the greateſt rejoicings both at London and Paris; and the infant prince ſeemed to be univerſally regarded as heir to both monarchies. But Henry's glory, when it ſeemed to be approaching the ſummit, was blaſted at once by death, and all his mighty projects vaniſhed. He was ſeized with a fiſtula, a diſtemper which at that time the phyſicians had not ſkill enough to cure; and he expired on the 31ſt of Auguſt 1422, in the 34th year of his age, and the 10th of his reign.

187
France invaded.

188
Death of Henry V.

189
Henry VI.

Henry VI. ſucceeded to the throne before he was quite a year old, and his reign affords only the moſt diſmal accounts of misfortunes and civil wars. His relations very ſoon began to diſpute about the adminiſtration during the minority. The duke of Bedford, one of the moſt accompliſhed princes of the age, was appointed by parliament protector of England, defender of the church, and firſt counſellor to the king. His brother, the duke of Gloceſter, was fixed upon to govern in his abſence, while he conducted the war in France; and, in order to limit the power of both brothers, a council was named, without whoſe advice and approbation no meaſure could be carried into execution.

The kingdom of France was now in the moſt deſperate ſituation. The Engliſh were maſters of almoſt the whole of it. Henry VI. though but an infant, was ſolemnly inveſted with regal power by legates from Paris; ſo that Charles VII. of France ſucceeded only to a nominal kingdom. With all theſe great advantages, however, the Engliſh daily loſt ground; and, in the year 1450, were totally expelled from France *. It may eaſily be imagined, that ſuch a train of bad ſucceſs would produce diſcontents among the rulers at home. The duke of Gloceſter was envied by many on account of his high ſtation. Among theſe was Henry Beaufort, biſhop of Wincheſter, great uncle to the king, and the legitimate ſon of John of Gaunt brother to Richard II. The prelate, to whom the care of the king's education had been committed, was a man of great capacity and experience, but of an intriguing and dangerous diſpoſition. He had frequent diſputes with the duke of Gloceſter, over whom he gained ſeveral advantages on account of his open temper. The duke of Bedford employed both his own authority and that of parliament to reconcile them, but in vain; their mutual animoſities ſerved for ſeveral years to embarraſs government, and to give its enemies every advantage. The ſentiments of the two leaders were particularly divided with regard to France. The biſhop laid hold of every proſpect of accommodation with that country; and the duke of Gloceſter was for maintaining the honour of the Engliſh arms, and regaining whatever had been loſt by defeats or delay. Both parties called in all the auxiliaries they could. The biſhop reſolved to ſtrengthen himſelf by procuring a proper match for Henry, at that time 23 years old; and then bringing over the queen to his intereſts. Accordingly, the earl of Suffolk, a nobleman whom he knew to be ſtedfaſt in his attachments, was ſent over to France, apparently to ſettle the terms of a truce which had then been begun, but in reality to procure a ſuitable match for the king.

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Married to Margaret of Anjou.

The biſhop and his friends had caſt their eye on Margaret of Anjou, daughter of Regnier, titular king of Sicily, Naples, and Jeruſalem; but without either real power or poſſeſſions. She was conſidered as the moſt accompliſhed princeſs of the age, both in mind and perſon; and it was thought would, by her own abilities, be able to ſupply the defects of her huſband, who appeared weak, timid, and ſuperſtitious. The treaty was therefore haſtened on by Suffolk, and ſoon after ratified in England. The queen came immediately into the biſhop's meaſures: Gloceſter was deprived

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* See *France*.

ved of all real power, and every method taken to render him odious to the public. One ſtep taken for this purpoſe was to accuſe his ducheſs of witchcraft. She was charged with converſing with one Roger Bolingbroke, a prieſt and reputed necromancer; and alſo with one Mary Gourdemain, who was ſaid to be a witch. It was aſſerted that theſe three in conjunction had made an image of the king in wax, which was placed before a gentle fire; and as the wax diſſolved, the king's ſtrength was expected to waſte; and upon its total diſſolution, his life was to be at an end. This accuſation was readily believed in that ſuperſtitious age. The priſoners were pronounced guilty; the ducheſs was condemned to do penance and ſuffer perpetual impriſonment; Bolingbroke the prieſt was hanged, and the woman burnt in Smithfield.

The biſhop, called alſo the *cardinal*, of Wincheſter, was reſolved to carry his reſentment againſt Gloceſter to the utmoſt. He procured a parliament to be ſummoned, not at London, which was too well affected to the duke, but at St Edmundſbury, where his adherents were ſufficiently numerous to overawe every opponent. As ſoon as Gloceſter appeared, he was accuſed of treaſon and thrown into priſon; and on the day on which he was to make his defence, he was found dead in his bed, though without any ſigns of violence upon his body.

191 Duke of Gloceſter murdered.

The death of the duke of Gloceſter was univerſally aſcribed to the cardinal of Wincheſter, who himſelf died ſix weeks after, teſtifying the utmoſt remorſe for the bloody ſcene he had acted. What ſhare the queen had in this tranſaction, is uncertain; but moſt people believed that without her knowledge the duke's enemies durſt not have ventured to take away his life. The king himſelf ſhared in the general ill-will, and he never had the art to remove the ſuſpicion. His incapacity alſo began every day to appear more clearly, and a pretender to the throne ſoon made his appearance.

192 Duke of York's title to the crown.

In the year 1450, Richard duke of York began to think of preferring his claims to the crown. All the males of the houſe of Mortimer were extinct; but Anne, the ſiſter of the laſt earl of Marche, having eſpouſed the earl of Cambridge, who had been beheaded for treaſon in the reign of Henry V. had tranſmitted her latent, but not yet forgotten claim, to her ſon Richard. This prince, deſcended by his mother from Philippa only daughter of the duke of Clarence, ſecond ſon of Edward III. ſtood plainly in order of ſucceſſion before the king; who derived his deſcent from the duke of Lancaſter, third ſon of that monarch. The duke was a man of valour and abilities, as well as of ſome ambition; and he thought the weakneſs and unpopularity of the preſent reign afforded a favourable opportunity to aſſert his title. The enſign of Richard was a white roſe, that of Henry a red one; and this gave names to the two factions, who were now about to drench the kingdom in blood.

After the cardinal of Wincheſter's death, the duke of Suffolk, who alſo had been concerned in the aſſaſſination of Gloceſter, governed every thing with uncontroulable ſway. His conduct ſoon excited the jealouſy of the other nobility, and every odious or unſucceſsful meaſure was attributed to him. The duke, however, imagining that his crimes were of ſuch a nature as could not be proved, boldly called upon his enemies to ſhew an inſtance of his guilt. The houſe of commons immediately opened againſt him a charge of corruption, tyranny, and treaſon. He was accuſed of being the cauſe of the loſs of France; of perſuading the French king, with an armed force, to invade England; and of betraying the ſecrets of ſtate. The popular reſentment againſt him was ſo ſtrong, that Henry, in order to ſecure him as much as poſſible, ſentenced him to five years baniſhment. This was conſidered by his enemies as an eſcape from juſtice. The captain of a ſhip was therefore employed to intercept him in his paſſage to France. He was ſeized near Dover, his head ſtruck off on the ſide of a long-boat, and his body thrown into the ſea.

193 Inſurrection of John Cade.

The complaints againſt Henry's government were heightened by an inſurrection headed by one John Cade, a native of Ireland. He had been obliged to fly over into France for his crimes: but, on his return, ſeeing the people prepared for violent meaſures, he aſſumed the name of *Mortimer*; and, at the head of 20,000 Kentiſh men, advanced towards Blackheath. The king ſent a meſſage to demand the cauſe of their riſing in arms. Cade in the name of the community anſwered, That their only aim was to puniſh evil miniſters, and procure a redreſs of grievances for the people. On this a body of 15,000 troops were levied, and Henry marched with them in perſon againſt Cade, who retired on his approach, as if he had been afraid of coming to an engagement. He lay in ambuſh, however, in a wood; not doubting but he ſhould be purſued by the king's whole army: but Henry was content with ſending a detachment after the fugitives, and returning to London himſelf; upon which Cade iſſued from his ambuſcade, and cut the detachment in pieces. Soon after, the citizens of London opened their gates to the victor; and Cade, for ſome time, maintained great order and regularity among his followers. He always led them out into the fields in the night-time, and publiſhed ſevere edicts againſt plunder and violence of any kind. He was not, however, long able to keep his people in ſubjection. He beheaded the treaſurer Lord Say, without any trial; and ſoon after, his troops committing ſome irregularities, the citizens reſolved to ſhut their gates againſt him. Cade endeavouring to force his way, a battle enſued, which laſted all day, and was ended only by the approach of night. The archbiſhop of Canterbury, and the chancellor, who had taken refuge in the tower, being informed of the ſituation of affairs, drew up, during the night, an act of amneſty, which was privately diſperſed among the rebels. This had ſuch an effect, that in the morning Cade found himſelf abandoned by his followers; and retreating to Rocheſter, was obliged to fly alone into the wolds. A price being ſet on his head by proclamation, he was diſcovered and ſlain by one Alexander Eden; who, in recompence for this ſervice, was made governor of Dover caſtle.

The duke of York was well pleaſed to ſee theſe inſurrections and diſcontents, which he reſolved to encourage to the utmoſt of his power. Though he aſpired to the crown, he did not yet think it proper to aſſert his right by force of arms; but he was at laſt put into a ſituation favourable to the accompliſhment of his wiſhes by an unexpected accident. The king fell into

194 Hiſtory of the civil war between Henry and the duke of York.

a lethargic diſorder, which increaſed his natural imbecillity to ſuch a degree that he could not maintain even the appearance of royalty any longer. The duke of York was then appointed lieutenant and protector of the kingdom, with powers to hold parliaments at pleaſure. Upon this all the adherents of the houſe of Lancaſter were immediately dimiſſed from court, and ſome of them impriſoned: the duke for ſome time continued peaceably in the enjoyment of his power; but at length the king recovering from his lethargic complaint, and ſurpriſed to find himſelf totally deprived of his authority, was perſuaded by the queen to depoſe the duke of York. The latter had inſtantly recourſe to arms; and Henry, though ſore againſt his will, was obliged to face him in the field. A battle enſued at St Alban's; in which the royaliſts were defeated, and the duke of Somerſet, the chief partiſan of their cauſe, killed in the action. The king himſelf was wounded, and took ſhelter in a cottage near the field of battle; where he was taken priſoner, but was afterwards treated with great reſpect and kindneſs by the duke of York.

Henry, though he was now only a priſoner treated with the forms of royalty, was nevertheleſs pleaſed with his ſituation; but his queen, a woman of a bold and maſculine ſpirit, could not bear to have only the appearance of authority, while others enjoyed all the real power. She therefore excited the king once more to aſſert his right by force of arms; and the duke of York was obliged to retire from court. A negociation for peace was at firſt ſet on foot, but the mutual diſtruſts of both parties ſoon broke it off. The armies met at Bloreheath on the borders of Staffordſhire, on the 23d of September 1459; and the Yorkiſts at firſt gained ſome advantages. But when a more general engagement was about to enſue, a body of veterans who ſerved under the duke of York, deſerted to the king; and this ſo intimidated the duke's party, that they ſeparated the next day without ſtriking a blow. The duke of York fled to Ireland; and the earl of Warwick, one of his ableſt and beſt ſupporters, eſcaped to Calais, with the government of which he had been entruſted during the late protectorſhip.

The York party, though thus in appearance ſuppreſſed, only waited a favourable opportunity of retrieving their affairs. Nor was this opportunity long wanting. Warwick having met with ſome ſucceſſes at ſea, landed in Kent; and being there joined by other barons, marched up to London amidſt the acclamations of the people. The city immediately opened its gates to him, and he ſoon found himſelf in a condition to face the royal army. An engagement enſued at Northampton on the 10th of July 1460; in which the royaliſts were entirely defeated, and the king again taken priſoner. The duke of York then openly laid claim to the crown; and on this occaſion the firſt inſtance of a ſpirit of national liberty is ſaid to have appeared in the houſe of lords. The cauſe of Henry and the duke of York was ſolemnly debated; and the latter, though a conqueror, did not abſolutely gain his cauſe. It was determined that Henry ſhould poſſeſs the throne during his life; and that the duke of York ſhould be appointed his ſucceſſor, to the utter excluſion of the prince of Wales, who was then a child.

Though the royal party now ſeemed deſtitute of every reſource, the queen ſtill retained her intrepidity. She fled into Wales, where ſhe endeavoured to raiſe another army. The northern barons, provoked at the ſouthern ones for ſettling the government and ſucceſſion to the crown without their conſent, ſoon furniſhed her with an army of 20,000 men. Another battle was fought near Wakefield Green, on the 24th of December 1460. The Yorkiſts were defeated, and the duke himſelf was killed in the action. His head was afterwards cut off by the queen's orders, and fixed on one of the gates of York, with a paper-crown, in deriſion of his pretended title. His ſon the earl of Rutland, a youth of 17, was taken priſoner, and killed in cold blood by lord Clifford, in revenge for his father's death, who had fallen in the battle of St Alban's.

195 Duke of York killed.

After this victory, Margaret marched towards London, in order to ſet the king at liberty; but the earl of Warwick, who now put himſelf at the head of the Yorkiſts, led about the captive king, in order to give a ſanction to his proceedings. He engaged the queen's forces at St Albans; but through the treachery of lord Lovelace, who deſerted during the heat of the engagement with a conſiderable body of forces, Warwick was defeated, and the king fell once more into the hands of his own party.

The ſubmiſſion of the city of London ſeemed now to be the only thing wanting to complete the queen's ſucceſs; but Warwick had ſecured it in his intereſts, and the citizens refuſed to open their gates to the queen. In the mean time, young Edward, eldeſt ſon of the late duke of York, put himſelf at the head of his father's party. He was now in the bloom of youth, remarkable for the beauty of his perſon and his bravery, and was a great favourite of the people. He defeated Jaſper Tudor earl of Pembroke, at Mortimer's croſs in Herefordſhire. The earl himſelf was taken priſoner, and immediately beheaded by Edward's orders. After this, he advanced to London; and being joined by the remainder of Warwick's army, he ſoon obliged Margaret to retire, entered the city amidſt the acclamations of the people, and was crowned king on the 5th of March 1461.

196 Edward IV.

Notwithſtanding all her misfortunes, however, Margaret ſtill continued undaunted. She retired to the north, where ſhe was ſoon joined by ſuch numbers, that her army amounted to 60,000 men. She was oppoſed by young Edward and Warwick at the head of 40,000; and both armies met near Touton in the county of York, on the 29th of March 1461. A bloody battle enſued, in which the queen's army was totally defeated; and as Edward, prompted by his natural cruelty, had ordered no quarter to be given, 40,000 of the Lancaſtrians were ſlain in the field or in the purſuit. After this diſaſter the queen fled to Scotland with her huſband and ſon; and notwithſtanding all the misfortunes ſhe had already met with, reſolved once more to enter England at the head of 5000 men granted her by the king of France. But even here ſhe was attended by her uſual bad fortune. Her little fleet was diſperſed by a tempeſt, and ſhe herſelf eſcaped with the utmoſt difficulty by entering the mouth of the Tweed. Soon after, a defeat, which her few forces ſuſtained at Hexham, ſeemed to render her cauſe entirely deſperate; and the cruelties practiſed upon all her adherents rendered it very dangerous to befriend her.

This laſt misfortune ſeemed to deprive the queen of every reſource. She and her huſband were obliged to ſeek for ſafety in a ſeparate flight, without attendants, and even without the neceſſaries of life. The unfortunate king imagined he could remain concealed in England; but in this he was deceived. He was taken priſoner, carried to the tower of London, and there ignominiouſly confined. The queen fled with her ſon into a foreſt; where, during the night, ſhe was ſet upon by robbers, who deſpoiled her of her rings and jewels, and treated her with the utmoſt indignity. One of theſe robbers, however, more compaſſionate than the reſt, conducted her to the ſea-coaſt; whence ſhe made her eſcape to Flanders, where her father, though very poor, entertained her as well as he was able. To the ſame courts retired the dukes of Somerſet and Exeter; and both of them ſuffered the greateſt degree of miſery and want. Philip de Comines, the French hiſtorian, ſays, that he ſaw the duke of Exeter following the duke of Burgundy's equipage barefooted, and ſerving for his livelihood as a footman.

Edward being now ſecurely fixed on the throne, began to give a looſe to his favourite paſſions, which were cruelty and an immoderate love of women. Warwick, in order to divert him from the laſt of theſe, adviſed him to marry, and with his conſent went over to France in order to conclude a match with Bona princeſs of Savoy. Warwick ſucceeded in his negotiation; but in the mean time king Edward had privately married Elizabeth Woodville, daughter of Sir Philip Woodville who had eſpouſed the ducheſs of Bedford after her firſt huſband's death. This incident exceedingly diſguſted Warwick; and as the king took every occaſion of widening the breach, an open rupture ſoon took place.

197 Inſurrection againſt him by Warwick.

After ſome unſucceſsful attempts in England, Warwick, together with the duke of Clarence the king's brother, whom he had drawn into his ſchemes, left the kingdom. They embarked for Calais, and ſeized upon ſome Flemiſh veſſels which they found lying along that coaſt. With theſe they entered one of the ports of France, and formed an alliance with Margaret the exiled queen. Lewis king of France prepared a fleet to reconduct them to England; and ſeizing a proper opportunity, they landed at Dartmouth with a ſmall body of troops, while Edward was in the north ſuppreſſing an inſurrection which had lately appeared there. Warwick was attended with aſtoniſhing ſucceſs on his arrival in England, and in leſs then ſix days ſaw himſelf at the head of 60,000 men. Edward was now obliged in his turn to fly the kingdom. Having narrowly eſcaped an attempt made upon his perſon by the marquis of Montague, he embarked on board a ſmall fleet which lay off Lynn in Norfolk. While at ſea he, was chaſed by ſome ſhips belonging to the Hanſe towns that were then at war both with France and England; but at length, having eſcaped all dangers, Edward landed ſafely in Holland, where he met with but an indifferent reception from the duke of Burgundy, with whom he had lately entered into an alliance.

Warwick in the mean time advanced to London, and once more releaſed and placed on the throne the miſerable king Henry VI. A parliament was called, which very ſolemnly confirmed Henry's title to the throne, and Warwick himſelf was dignified by the people with the title of the *king-maker*. All the attainders of the Lancaſtrians were reverſed; and every one was reſtored who had loſt either honours or fortune by his former adherence to Henry's cauſe. All the adherents of Edward fled to the continent, or took ſhelter in monaſteries, where they were protected by the eccleſiaſtical privileges. But Edward's party was not yet deſtroyed. After an abſence of nine months, being ſeconded by a ſmall body of troops granted him by the duke of Burgundy, he made a deſcent at Ravenſpur in Yorkſhire. At firſt he met with an indifferent reception; but his army increaſing on his march, he was ſoon in a condition to appear before the capital, which immediately opened its gates.

The unfortunate Henry was thus again plucked from the throne; and the hopes of Warwick were almoſt totally blaſted by the defection of Clarence, Edward's brother. Nothing now remained but to come to an engagement as ſoon as poſſible. Warwick knew his forces to be inferior to thoſe of Edward, but placed great dependence on his own generalſhip. He therefore advanced to Barnet, within ten miles of London, where he reſolved to wait the coming of Edward. The latter ſoon came up with him, and on the 14th of April 1471, a moſt obſtinate and bloody battle was fought. Edward, according to cuſtom, had ordered no quarter to be given; and obtained the victory through a miſtake of a body of Warwick's forces, who fell with fury on their own party inſtead of the enemy. The earl himſelf was ſlain, together with his brother, and 10,000 of his braveſt followers.

The queen was juſt then returned with her ſon from France, where ſhe had been ſoliciting ſupplies. She had ſcarce time to refreſh herſelf from the fatigues of the voyage, when ſhe received the fatal news of the death of Warwick, and the total deſtruction of her party. All her reſolution was not able to ſupport her under ſuch a terrible diſaſter. Her grief now for the firſt time, it is ſaid, manifeſted itſelf by her tears; and ſhe immediately took ſanctuary in the abbey of Beaulieu in Hampſhire. Here ſhe ſtill found ſome friends willing to aſſiſt her. Tudor earl of Pembroke, Courtney earl of Devonſhire, the lords Wenlock and St John, with ſome other men of rank, encouraged her yet to hope for ſucceſs, and promiſed to ſtand by her to the laſt. On this aſſurance, ſhe reſumed her courage; and advancing through the counties of Devon, Somerſet, and Glouceſter, encreaſed her army every day. At laſt, however, ſhe was overtaken by Edward with his victorious army at Tewkeſbury, on the banks of the Severne. The queen's army was totally defeated; the earl of Devonſhire and lord Wenlock were killed in the field; the duke of Somerſet, and about 20 other perſons of diſtinction, who had taken ſhelter in a church, were ſurrounded, dragged out, and immediately beheaded; about 3000 of their party fell in battle, and the army was entirely diſperſed. Queen Margaret and her ſon were taken priſoners, and brought to the king, who aſked the prince in an inſulting manner, how he dared to invade his dominions? The young prince replied, that he came thither to claim his juſt inheritance; upon which Edward ſtruck him on the face with his gauntlet. The dukes of Clarence and Glouceſter, lord Haſtings,

198 Total deſtruction of the queen's party.

ſtings, and Sir Thomas Grey, taking this blow as a ſignal for farther violence, hurried the prince into the next apartment, and there diſpatched him with their daggers. Margaret was thrown into the tower along with her huſband Henry, who expired in that confinement a few days after. It was univerſally believed that he was murdered by the duke of Gloceſter, though of this there was no direct evidence. Margaret was ranſomed by the king of France for 50,000 crowns, and died a few years after in a moſt miſerable ſituation.

Edward being now freed from all his enemies, began to inflict puniſhment on thoſe who had formerly appeared againſt him. Among the cruelties he committed, that on his brother the duke of Clarence was the moſt remarkable. The king happening to be one day hunting in the park of Thomas Burdet, a ſervant of the duke, killed a white buck, which was a great favourite of the owner. Burdet, vexed at the loſs, broke out into a paſſion, and wiſhed the horns of the deer in the belly of the perſon who adviſed the king to that inſult. For this exclamation Burdet was tried for his life, and executed at Tyburn. The duke of Clarence exclaimed againſt the iniquity of this ſentence; upon which he was arraigned before the houſe of peers, found guilty, and condemned to death. The only favour granted him was to have the choice of his death; and his choice was a very ſingular one, namely, to be drowned in a butt of malmſey wine, which was accordingly done.—The reſt of this reign affords little elſe than an hiſtory of the king's amours. Among his many miſtreſſes, Jane Shore was the moſt remarkable. She was the wife of a merchant in the city, and a woman of exquiſite good ſenſe and beauty; but ſhe had not virtue ſufficient to reſiſt the ſolicitations of a handſome man and a monarch.—The king died on the 9th of April 1482, in the 42d year of his age, and 21ſt of his reign, counting from his firſt aſſuming the crown. Beſides five daughters, he left two ſons; Edward prince of Wales, his ſucceſſor, then in his 13th year; and Richard duke of York in his ninth.

199 Edward V. On the death of Edward IV. the kingdom was divided into two new factions. The queen's family, which, during the laſt reign, had come into power, was become obnoxious to the old nobility, who conſidered them as their inferiors. The king had endeavoured to prevent theſe animoſities from coming to a height, by deſiring, on his death-bed, that his brother Richard duke of Gloceſter ſhould be entruſted with the regency; and recommended peace and unanimity during the minority of his ſon. But the king was no ſooner dead, than the former reſentment between theſe parties broke out with violence; and the duke of Gloceſter, who was endued with almoſt every bad quality, reſolved to profit by their contentions. His firſt ſtep was to get himſelf declared protector of the realm; and having arreſted the earl of Rivers, the king's uncle and guardian, he met young Edward in his way from Ludlow caſtle, where the late king had reſided during the latter part of his reign, and reſpectfully offered to conduct him to London. Having thus ſecured the perſon of the king, he next got poſſeſſion of his brother's perſon alſo. The queen had retired with this child into Weſtminſter Abbey; and it was not without extreme regret that ſhe delivered him up at the interceſſion of the primate and archbiſhop of York.

In a few days after Gloceſter had made himſelf maſter of the perſons of the two princes, he had them confined in the tower, under pretence of guarding them from danger; and ſoon after ſpread reports of their illegitimacy, and by pretended obſtacles put off the young king's coronation. Lord Stanley firſt began to ſuſpect his deſigns; and communicated his ſuſpicions to lord Haſtings, who had long been firmly attached to the king's family. Lord Haſtings would not at firſt give credit to this ſurmiſe; but he very ſoon had a fatal proof of the truth of what had been communicated to him. On the 13th of June 1483, he was hurried out of the council-room in the tower by Gloceſter's order, and beheaded on a log of timber. The ſoldiers who carried him off made a buſtle as though an attempt had been made to reſcue him, and one of them diſcharged a blow at lord Stanley's head with a pole-ax; but he happily eſcaped it by ſhrinking under the table. The ſame day were executed the earl Rivers, and ſome others, who had committed no other crime than being faithful to the young king. 200 Puniſhment of Jane Shore. To ingratiate himſelf with the populace, Gloceſter next accuſed the late king's miſtreſs, Jane Shore, of witchcraft; but, as nobody would give credit to this charge, he had her proſecuted for incontinency, and deſerting her huſband to live in adultery with another man. To this accuſation ſhe pleaded guilty; and was condemned to walk bare-foot through the city, and to do penance in St Paul's church in a white ſheet, with a wax taper in her hand, before thouſands of ſpectators. She lived about 40 years after this ſentence, reduced to the moſt extreme wretchedneſs; and Sir Thomas More aſſures us, that he ſaw her gathering herbs for food in a field near the city.

The protector now thought he might with ſafety lay claim to the throne. He had previouſly gained over the duke of Buckingham, a nobleman of great influence among the people. He uſed his utmoſt endeavours to inſpire the people with a notion of the illegitimate birth of the late king, and conſequently of his children. Dr Shaw, a popular preacher, was alſo hired to harangue the people to the ſame purpoſe from St Paul's croſs. Having expatiated on the incontinence of the queen, and the illegality of the young king's title, he then made a panegyric on the virtues of the protector. "It is the protector, (continued he,) who carries in his face the image of virtue, and the marks of a true deſcent. He alone can reſtore the loſt glory and honour of the nation." It was hoped, that, upon this occaſion, ſome of the populace would have cried out, "Long live king Richard!" but the audience remaining ſilent, the duke of Buckingham undertook in his turn to perſuade them. Having expatiated on the calamities of the laſt reign, and the illegitimacy of the preſent race, he told the people, that he ſaw only one method of warding off the miſeries which threatened the ſtate, which was by electing the protector; but he ſeemed apprehenſive that he would never be prevailed upon to accept a crown accompanied with ſuch difficulty and danger. He next aſked his auditors, whether they would have the protector for their king; but was mortified to find that a total ſilence enſued. The mayor, who was in the ſecret, willing to relieve him in this embarraſſed ſituation, obſerved, that the citizens were not accuſtomed to be harangued by a man of his quality, and would only give an anſwer to their recorder. This officer, therefore, repeated the duke's ſpeech; but the people continuing ſtill ſilent, "This is ſtrange obſtinacy, (cried the duke): we only require of you, in plain terms, to declare, whether or not you will have the duke of Glouceſter for your king; as the lords and commons have ſufficient power without your concurrence." At this, ſome of the meaneſt apprentices, incited by the ſervants of the protector and Buckingham, raiſed a feeble cry of "God ſave king Richard!" The mob at the door repeated the cry; and throwing up their caps into the air, cried out, "A Richard! A Richard!" After this farce was acted, Buckingham, on the 24th of June 1483, waited on Richard with offers of the crown: but the protector, with hypocritical modeſty, at firſt declined the offer; till being told that the people, in caſe of his refuſal, muſt look out for one that would be more compliant, he accepted the government of England and France, with a reſolution, as he ſaid, to defend the one and ſubdue the other.

201
ichard III.

The firſt ſtep taken by the new king was to ſend orders to Sir Robert Brackenbury governor of the tower, to put the young princes to death. But this he refuſed; and ſubmiſſively anſwered, that he knew not how to embrue his hands in innocent blood. A fit inſtrument for this purpoſe, however, was not long wanting. Sir James Tyrrel readily undertook the office; and Brackenbury was ordered to reſign the keys to him for one night. Tyrrel chooſing three aſſociates, Slater, Deighton, and Foreſt, came in the night-time to the door of the chamber where the princes were lodged; and ſending in the aſſaſſins, bid them execute their commiſſion, while he himſelf ſtaid without. They found the young princes in bed, and fallen into a ſound ſleep. The aſſaſſins ſmothered them with the bolſter and pillows; after which they ſhewed their naked bodies to Tyrrel, who ordered them to be buried at the ſtair-foot under an heap of ſtones.

202
ward V.
brother
rdered.

Richard having thus ſecured himſelf on the throne by the moſt iniquitous methods, attempted to ſtrengthen his intereſt by foreign alliances, and procuring the favour of the clergy at home by great indulgences; but he found his power threatened from a quarter where he leaſt expected an attack. The duke of Buckingham, who had been ſo inſtrumental in raiſing him to the throne, did not think himſelf properly rewarded. He made a demand of ſome confiſcated lands in Hereford, to which his family had an ancient claim. Richard either reluctantly complied with his requeſt, or only granted it in part; ſo that a coolneſs ſoon enſued between them, and in a little time Buckingham came to a reſolution of dethroning the monarch whom he had juſt raiſed. For ſome time he remained in doubt, whether he ſhould aſſume the crown himſelf, or ſet up another. At length he determined on the latter; and reſolved to declare for Henry earl of Richmond, who was at that time an exile in Brittany, and was conſidered as the only ſurviving branch of the houſe of Lancaſter. He was one of thoſe who had the good fortune to eſcape the numerous maſſacres of the former reigns; but, as he was a deſcendant of John of Gaunt by the female line, he was for that reaſon obnoxious to thoſe in power. He had long lived in exile, and was once delivered over to the ambaſſadors of Edward IV. who were preparing to carry him over to England; when the duke of Brittany who delivered him, repented of what he had done, and took him from the ambaſſadors juſt as they were carrying him on ſhipboard. Between him and Buckingham a negociation was ſoon begun; and, in order to ſtrengthen Henry's title, a marriage was projected between him and the princeſs Elizabeth, eldeſt daughter of the late king; and the queen dowager was prevailed on to accede to the meaſure.

203
Inſurrection of the duke of Buckingham for the earl of Richmond.

Richard, in the mean time, beginning to ſuſpect Buckingham's fidelity, ſent for him to court; but he, inſtead of obeying the ſummons, fled into Wales, where he raiſed a conſiderable army: Richard immediately put himſelf in a poſture of defence, by levying ſome troops in the north, with whom he marched againſt the inſurgents. In the mean time, however, Buckingham's forces being ſtopped by an inundation of the Severn, and finding it impoſſible to ſubſiſt on their own ſide of that river, diſperſed themſelves, notwithſtanding the duke's utmoſt efforts to keep them together. The duke took refuge in the houſe of one of his old ſervants; by whom he was betrayed to the ſheriff of Shropſhire, and inſtantly condemned and executed.—The earl of Richmond, who had by this time landed in England, finding his hopes fruſtrated by the failure of Buckingham, haſtily ſet ſail again, and ſafely landed in Brittany. Richard ſent ambaſſadors to Landais the duke of Brittany's miniſter, to treat about delivering up Henry to him. The miniſter entered into the negociation; but Richmond having got notice of their intentions, fled into France, and reached the confines of that country when he was on the point of being overtaken by his enemies.

204
Buckingham executed.

205
Richmond invades England.

It was not long, however, before Richard heard that the earl of Richmond was making new preparations for the invaſion of England. As the king knew not in what quarter to expect the invader, he took poſt at Nottingham, in the centre of the kingdom; and he had given commiſſion to ſeveral of his officers to oppoſe the enemy wherever he ſhould land. Richmond, in the mean time, ſet out from Harfleur in Normandy, with a retinue of about 2000 perſons; and, after a navigation of ſix days, landed without oppoſition at Milford Haven in Wales, on the 7th of Auguſt 1485. Sir Rice ap Thomas, and Sir Walter Herbert, who were entruſted by Richard to oppoſe him in Wales, were both in his intereſt. The one deſerted to him on his firſt appearance, and the other made but a very feeble reſiſtance. On the news of this deſcent, Richard inſtantly reſolved to meet his antagoniſt, and decide their mutual pretenſions by a battle. Richmond, on the other hand, being reinforced by Sir Thomas Bourchier, Sir Walter Hungerford, and others, to the number of about 6000, boldly advanced with the ſame intention. In a few days both armies approached each other at Boſworth field near Leiceſter. The engagement began on the 22d of Auguſt 1485. Henry had about 6000 men, and Richard more than double that number; but lord Stanley, who commanded upwards of 7000 men for Richard, had made ſuch a diſpoſition as enabled him on occaſion to join either party. Richard eaſily knew his intentions, but concealed them from his own men for fear of diſcouraging them; but, ſoon after the battle began, lord Stanley, by joining the earl of Richmond's party, determined the victory in his favour. The tyrant perceiving his ſituation to be quite deſperate, and ſeeing his rival at no great diſtance from him, drove up againſt him with fury, in hopes that either Henry's death or his own would decide the victory between them. He killed Sir William Brandon the earl's ſtandard-bearer; he diſmounted Sir John Cheyney; and was within reach of Richmond, when Sir William Stanley breaking in with his troops, Richard was ſurrounded and overwhelmed by numbers. His body was found in the field, covered with dead enemies, and beſmeared with blood. It was thrown careleſsly acroſs a horſe, carried to Leiceſter amidſt the ſhouts of inſulting ſpectators, and interred in the Gray-Friar's church of that place.

206 Richard defeated and killed.

The uſurper's crown being found on the field of battle, was placed on the head of the conqueror, while the whole army cried out, "Long live king Henry!" Two days after the battle, Henry gave orders to confine Edward Plantagenet earl of Warwick, and ſon of the unfortunate duke of Clarence; and to releaſe the princeſs Elizabeth, who had been confined in the tower. He then advanced by ſlow and gradual marches to the city of London, where he was received with the greateſt demonſtrations of joy. He was crowned king of England on the 30th of October 1485; and, to heighten the ſplendor on that occaſion, he beſtowed the rank of knights-banneret on 12 perſons, and conferred peerages on three. Jaſper earl of Pembroke, his uncle, he created duke of Bedford; Thomas lord Stanley his father-in-law, earl of Derby; and Edward Courtenay, earl of Devonſhire. At the coronation likewiſe appeared a new inſtitution, which the king had eſtabliſhed for perſonal ſecurity as well as pomp; a band of 50 archers, who were denominated yeomen of the guard. But leſt the people ſhould take umbrage at this ſtep, as if it implied a diffidence of his ſubjects, he declared the inſtitution to be perpetual. The ceremony of the coronation was performed by cardinal Bourchier archbiſhop of Canterbury.—On the 18th of January 1486, he was married to the princeſs Elizabeth; and his marriage was celebrated at London with greater appearance of joy than either his firſt entry or his coronation had been. Henry remarked, with much diſpleaſure, this general favour borne to the houſe of York; and the ſuſpicions ariſing from it, not only diſturbed his tranquillity during the whole of his reign, but bred diſguſt towards his conſort herſelf, and poiſoned all his domeſtic enjoyments.

207 Henry VII.

The reign of Henry VII. was for ſeveral years diſturbed by plots and inſurrections. The people, by a long courſe of civil war, had become ſo turbulent and factious, that no governor could rule, nor could any king pleaſe them. One rebellion ſeemed extinguiſhed only to give riſe to another. The king at the beginning of his reign had given orders for the confinement of the duke of Clarence's ſon, as already mentioned. This unfortunate youth, who had the title of earl of Warwick, was, thro' long confinement, quite unacquainted with the world, and ignorant of the moſt common affairs of life. Harmleſs as he was, however, he was made an inſtrument to deceive the people. One Richard Simon, who lived in Oxford, trained up a baker's ſon named *Lambert Simnel*, to counterfeit the perſon of the earl of Warwick. He was inſtructed by his tutor to talk of many facts and occurrences which had happened to him in the court of Edward. But as this impoſture could not bear a cloſe inſpection, it was thought proper that he ſhould firſt make his appearance in Ireland. Here he was received with the utmoſt joy. He was proclaimed king of Ireland; and conducted by the magiſtrates and populace of Dublin with great pomp to the caſtle, where he was treated conformably to his ſuppoſed birth and diſtinction. Henry eaſily perceived that his mother-in-law, diſguſted with the ſevere treatment he gave her daughter, was at the bottom of this impoſture. He therefore, by the advice of his council, confined her in a monaſtery, where ſhe remained as long as ſhe lived.—The next meaſure was to ſhew Warwick to the people. He was taken from the tower, and led through the principal ſtreets of London; after which he was conducted in ſolemn proceſſion to St Paul's, where great numbers were aſſembled to ſee him. Still, however, they proceeded in Dublin to honour their pretended monarch; and he was crowned with great ſolemnity in the preſence of the earl of Kildare, the chancellor, and the other officers of ſtate. At laſt, being furniſhed by the ducheſs of Burgundy with a body of 2000 veteran Germans under the command of Martin Swart, a brave and experienced officer, he reſolved to invade England. He landed in Lancaſhire, from whence he marched to York, expecting that the country-people would riſe and join him on his march. But in this he was deceived: the people were unwilling to join a body of foreigners; and were beſides kept in awe by the great reputation of Henry. Lord Lincoln, therefore, who commanded the rebel army, determined to bring the matter to a ſpeedy iſſue. Accordingly he met the royal army at Stoke in the county of Nottingham. An obſtinate engagement enſued, but at length king Henry obtained a complete victory. Lord Lincoln, with 4000 private men, periſhed in the battle; and Simnel with his tutor Simon were taken priſoners. Simon being a prieſt, could not be tried by the civil power, and was only committed to cloſe confinement. Simnel was pardoned, and made a ſcullion in the king's kitchen, whence he was afterwards advanced to the rank of falconer, in which employment he died.

208 Impoſture of Lambert Simnel.

209 Of Perkin Warbeck.

The bad ſucceſs of Simnel did not deter another from embarking in a ſimilar impoſture ſome years after. In 1492, the ducheſs of Burgundy cauſed a report to be ſpread, that the young duke of York, Edward V's brother, was ſtill alive; and finding the rumour greedily received, ſhe ſoon found a young man who aſſumed both his name and character. The perſon choſen to act this part was the ſon of one Oſbeck, or Warbeck, a converted Jew, who had been in England during the reign of Edward IV. His name was *Peter*; but it had been corrupted after the Flemiſh manner into *Peterkin*, or *Perkin*. It was by ſome believed, that Edward, among his other amorous adventures, had a ſecret correſpondence with Warbeck's wife, which might account for the great ſimilarity of features obſerved between Perkin and that monarch. The ducheſs of Burgundy found this youth entirely ſuited to her purpoſes. The leſſons ſhe gave him were eaſily learned and ſtrongly retained. His graceful air, his courtly addreſs, his eaſy manners, and elegant converſation, were capable of impoſing upon all but thoſe who were conſcious of the impoſture. The kingdom of Ireland was pitched upon for Perkin's firſt appearance, as it had been before for that of Simnel. He landed at Cork, and immediately aſſuming the name of *Richard Plantagenet*, was followed by great numbers of credulous people. He wrote letters to the earls of Deſmond and Kildare, inviting them to join his party; he diſperſed every where the ſtrange intelligence of his eſcape from his uncle Richard's cruelty; and, his ſtory meeting with general credit, he ſoon became an object of the public favour. All thoſe who were diſguſted with the king, prepared to join Perkin; but particularly thoſe who formerly were Henry's favourites, and had contributed to place him on the throne. Theſe, thinking their ſervices had not been ſufficiently repaid, now became heads of the conſpiracy. Their attempts, however, were all fruſtrated by the vigilance of the king, and moſt of the conſpirators of any note were publicly executed.

209 Of Perkin Warbeck.

Perkin finding it was in vain to attempt any thing in England, went to the court of James IV. of Scotland. Here he was received with great cordiality; and James carried his confidence in him ſo far, that he even gave him in marriage lady Catharine Gordon daughter to the earl of Huntley, and a near knſwoman of his own. But when he attempted to ſet him on the throne of England, he found himſelf totally diſappointed; and on the concluſion of peace between the two kingdoms, Perkin was obliged to leave Scotland. From thence he went to Flanders; and meeting with but a cool reception there, he reſolved to try the affections of the people of Cornwall, who had lately riſen againſt the king on account of a new tax which had been levied upon them. On his firſt appearance Perkin was joined by about 3000 of theſe people, with which force he laid ſiege to Exeter. Henry, however, having marched againſt him with a conſiderable army, Perkin's heart failed him, though his followers now amounted to 7000; and he took ſhelter in a monaſtery. His wife fell into the conqueror's hands; who placed her in a reſpectable ſituation near the queen's perſon, with a ſuitable penſion, which ſhe enjoyed till her death. Perkin being perſuaded to deliver himſelf into the king's hands, was compelled to ſign a confeſſion of his former life and conduct; but this was ſo defective and contradictory, that very little regard was paid to it. His life was granted him; though he was ſtill detained in cuſtody, and keepers were appointed to watch his conduct. From theſe, however, he broke looſe; and flying to the ſanctuary of Shyne, put himſelf into the prior's hands. He was once more prevailed upon to truſt himſelf in the king's hands, and was committed to the tower; but having here entered into a correſpondence with the earl of Warwick in order to make their eſcape, both of them were condemned and executed.

10 iſh na- civi- by y.

To Henry VII. in a great meaſure is owing the preſent civilized ſtate of the Engliſh nation. He had all along two points principally in view; the one to depreſs the nobility and clergy, and the other to exalt and humanize the populace. In the feudal times every nobleman was poſſeſſed of a certain number of vaſſals, over whom he had, by various methods, acquired an almoſt abſolute power; and, therefore, upon every ſlight diſguſt, he was able to influence them to join him in his revolt or diſobedience. Henry conſidered, that the giving of his barons a power to ſell their eſtates, which were before unalienable, muſt greatly weaken their intereſt. This liberty therefore he gave them; and it proved highly pleaſing to the commons, nor was it diſagreeable to the nobles themſelves. His next ſcheme was to prevent their giving liveries to many hundreds of their dependents, who were thus kept like the ſoldiers of a ſtanding army to be ready at the command of their lord. By an act paſſed in this reign, none but menial ſervants were allowed to wear a livery; and this law was enforced under ſevere penalties.

With the clergy, Henry was not ſo ſucceſsful. The number of criminals of all kinds who found protection in monaſteries and other places appointed for religious worſhip, ſeemed to indicate little leſs than an abſolute toleration of all kinds of vice. Henry uſed all his intereſt with the pope to get theſe ſanctuaries aboliſhed, but to no purpoſe. All that he could procure was, that if thieves, murderers, or robbers, regiſtered as ſanctuary men, ſhould ſally out and commit freſh offences, and retreat again, in ſuch caſes they might be taken out of the ſanctuary and delivered up to juſtice.

211 Death of Henry VII.

In 1500, the king's eldeſt ſon Arthur was married to the Infanta Catharine of Spain, which marriage had been projected and negotiated ſeven years. But the prince dying in a few months after marriage, the princeſs was obliged to marry his younger brother Henry, who was created prince of Wales in his room. Henry himſelf made all the oppoſition which a youth of 12 years of age is capable of; but as the king perſiſted in his reſolution, the marriage was by the pope's diſpenſation ſhortly after ſolemnized.—In the latter part of this king's reign, his œconomy, which had always been exact, degenerated into avarice, and he oppreſſed the people in a very arbitrary manner. He had two miniſters, Empſon and Dudley, perfectly qualified to ſecond his avaricious intentions. They were both lawyers, and uſually committed to priſon by indictment ſuch perſons as they intended to oppreſs; from whence they ſeldom got free but by paying heavy fines, which were called mitigations and compoſitions: but by degrees the very forms of law were omitted; and they determined in a ſummary way upon the properties of the ſubjects, and confiſcated their effects to the royal treaſury.—Henry VII. died of the gout in his ſtomach, in the year 1509, having lived 52 years, and reigned 23; and was ſucceeded by his ſon Henry VIII. In Henry VII.'s reign was built a large ſhip of war called the *Great Harry*, which coſt 14,000 pounds. This was, properly ſpeaking, the firſt ſhip in the Engliſh navy. Before this period, when the king wanted a fleet, he had no other expedient than to hire ſhips from the merchants.

212 Henry VIII.

Henry VIII. aſcended the throne when he was about 18 years of age, and had almoſt every advantage which a prince can have on his acceſſion. He had a well ſtored-treaſury, an indiſputed title, and was at peace with all the powers in Europe. Commerce and arts had been ſome time introduced into England, where they met with a favourable reception. The young prince himſelf was beautiful in his perſon, expert in all polite exerciſes, open and liberal in his air, and loved by all his ſubjects. The old king, who was himſelf a ſcholar, had inſtructed him in all the learning of the times, ſo that he was an adept in ſchool-divinity before the age of 18.

All theſe advantages, however, ſeemed to have been loſt upon the new king. Being deſtitute of a good heart and ſolid underſtanding, he proved a tyrant. Being always actuated, not by reaſon, but the paſſion which happened to be uppermoſt in his mind, he behaved in the moſt abſurd and contradictory manner; and however fortunate ſome of his meaſures proved at laſt, it is impoſſible that either his motives, or the means he took for the accompliſhment of his purpoſes, can be approved of by any good man.

One of Henry's firſt actions in his royal capacity was to puniſh Empſon and Dudley, who were obnoxious to the populace, on account of their having been the inſtruments of the late king's rapacity. As they could not be impeached merely on account of their having ſtrictly executed the will of the king, they were accuſed of having entered into a treaſonable conſpiracy, and of having deſigned to ſeize by force the adminiſtration of government; and though nothing could be more improbable than ſuch a charge, the general prejudice againſt them was ſo great, that they were both condemned and executed.

In 1510, the king entered into a league with pope Julius II. and Ferdinand king of Spain, againſt Lewis XII. of France. In this alliance Henry was the only diſintereſted perſon. He expected nothing beſides the glory which he hoped would attend his arms, and the title of *Moſt Chriſtian King*, which the pope aſſured him would ſoon be taken from the king of France to be conferred upon him. The pope was deſirous of wreſting from Lewis ſome valuable provinces which he poſſeſſed in Italy, and Ferdinand was deſirous of ſharing in the ſpoil. Henry ſummoned his parliament; who very readily granted him ſupplies, as he gave out that his deſign was to conquer the kingdom of France, and annex it to the crown of England. It was in vain that one of his old prudent counſellors objected, that conqueſts on the continent would only drain the kingdom without enriching it; and that England, from its ſituation, was not fitted to enjoy extenſive empire. The young king, deaf to all remonſtrances, and hurried away by his military ardour, reſolved immediately to begin the war. But after ſeveral attempts, which were rendered unſucceſsful only by the miſmanagement of thoſe who conducted them, a peace was concluded with France on the 7th of Auguſt 1514. See FRANCE.

Henry's arms were attended with more ſucceſs in Scotland. King James IV. with the greateſt part of the Scots nobility, and 10,000 of the common people, were cut off in the battle of Flowden, the greateſt defeat the Scots had ever received from the Engliſh*. Henry in the mean time, puffed up with his imaginary ſucceſſes againſt France, and his real ones againſt Scotland, continued to laviſh his treaſures by expenſive pleaſures, and no leſs expenſive preparations for war. The old miniſters who had been appointed by his father to direct him, were now diſregarded; and the king's confidence was entirely placed in Thomas, afterwards cardinal Wolſey, who ſeconded him in all his favourite purſuits, and who, being the ſon of a private gentleman at Ipſwich, had gradually raiſed himſelf to the firſt employments of the ſtate*. He doth not ſeem to have had many bad qualities beſides his exceſſive pride, which diſguſted all the nobility; but the great ſhare he poſſeſſed in the favour of ſuch an abſolute prince as Henry VIII. put him quite out of the reach of his enemies.

113 Cardinal Wolſey miniſter.

114 Arbitrary behaviour of the king.

The king having ſoon exhauſted all the treaſures left him by his father, as well as the ſupplies which he could by fair means obtain from his parliament, applied to Wolſey for new methods of repleniſhing his coffers. The miniſter's firſt ſcheme was to get a large ſum from the people under the title of *benevolence;* though no title could be more improperly applied, as it was not granted without the greateſt murmurings and complaints. Wolſey even met with oppoſition in the levying of it. In the firſt place, having exacted a conſiderable ſum from the clergy, he next applied himſelf to the houſe of commons; but they only granted him half the ſum he demanded. The miniſter at firſt was highly offended, and deſired to be heard in the houſe; but they replied that none could be permitted to ſit and argue there except ſuch as were members. Soon after, the king having occaſion for new ſupplies, by Wolſey's advice attempted to procure them by his prerogative alone, without conſulting his parliament. He iſſued out commiſſions to all the counties of England for levying four ſhillings in the pound from the clergy, and three ſhillings and fourpence from the laity. This ſtretch of royal power was ſoon oppoſed by the people, and a general inſurrection ſeemed ready to enſue. Henry endeavoured to pacify them by circular letters; in which he declared, that what he demanded was only by way of benevolence. The city of London, however, ſtill heſitated on the demand; and in ſome parts of the country inſurrections were actually begun. Theſe were happily ſuppreſſed by the duke of Suffolk; but the cardinal loſt ſomewhat of the king's favour on account of the improper advice he had given him. To reinſtate himſelf in his good graces, Wolſey made the king a preſent of a noble palace called *York-place*, at Weſtminſter, aſſuring him that from the firſt he had intended it for the king's uſe. In order to have a pretence for amaſſing more wealth, Wolſey next undertook to found two new colleges at Oxford; and for this purpoſe he received every day freſh grants from the pope and the king. The former imprudently gave him liberty to ſuppreſs ſome monaſteries, and make uſe of their revenues for the erection of his new colleges; but this was a fatal precedent for the pontiff's intereſts, as it taught the king to ſeize on the monaſtic revenues whenever he ſtood in need of money.

115 He deſires a divorce from his wife.

The cardinal continued to enjoy full power at the court of Henry VIII. till the year 1527, when an event happened which produced the moſt remarkable alterations both in church and ſtate. Henry had been 18 years married to Catharine of Arragon, who had before been married to his elder brother Arthur. But notwithſtanding the ſubmiſſive deference paid to the indulgence of the church, by which Henry had been allowed to marry his brother's widow, his marriage with this princeſs did not paſs without ſcruple and heſitation. The prejudices of the people in general were bent againſt a conjugal union between ſuch near relations; and it has been ſaid, that the late king, though he had forced both parties to marry each other when his ſon was but 12 years of age, had given many intimations that he intended to annul the marriage at a proper opportunity. It is poſſible, that the king might now begin to entertain ſcruples about the legality of his marriage; but as he indulged himſelf without reſtraint in the pleaſures of unlawful love, it ſeems much more probable, that the age and decay of the beauty of Catherine, who was ſix years older than himſelf, had prompted him to deſire a diſſolution of his marriage. He had lately fallen in love with Anna Bullen, or Boleyn, one of the maids of honour, and daughter of a gentleman of diſtinction, who was related to moſt of the nobility. She was a lady of great beauty and virtue; and as Henry found it impoſſible to make her comply with his criminal deſires, he formed a deſign of divorcing queen Catherine, and marrying Anne Boleyn.

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* See *Scotland*.

* See *Wolſey*.

216 Applies to the pope for a diſpenſation.

For this purpoſe he applied to pope Clement VII. deſiring him to diſſolve the bull of his predeceſſor which had given him a diſpenſation to marry Catherine; and to declare that it was not in the power even of the holy ſee to diſpenſe with a law ſo ſtrictly enjoined in ſcripture.

By this requiſition the pope was thrown into the greateſt perplexity. Queen Catherine was aunt to the emperor who had lately made Clement himſelf a priſoner, and whoſe reſentment he ſtill dreaded: and beſides, he could not with any degree of prudence declare the bull of the former pope illicit, as this would give a mortal blow to the doctrine of papal infallibility. On the other hand, Henry was his protector and friend; the dominions of England were the chief reſource from whence his finances were ſupplied; and the king of France, ſome time before, had got a bull of divorce in circumſtances nearly ſimilar. In this exigence he thought the wiſeſt method would be to ſpin out the affair by negociation; and in the mean time he ſent over a commiſſion to Wolſey, in conjunction with the archbiſhop of Canterbury, or any other Engliſh prelate, to examine the validity of the king's marriage, and of the former diſpenſation; granting them alſo a proviſional diſpenſation for the king's marriage with any other perſon.

The pope's meſſage was laid before the council in England: but they conſidered, that an advice given by the pope in this ſecret manner, might very eaſily be diſavowed in public; and that a clandeſtine marriage would totally invalidate the legitimacy of any iſſue the king might have by ſuch a match. In conſequence of this, freſh meſſengers were diſpatched to Rome, and evaſive anſwers returned;

217 s contro- ſy with pope.

the pope never imagining that Henry's paſſion would hold out during the tedious courſe of an eccleſiaſtical controverſy. But in this he was miſtaken. The king of England had been taught to diſpute as well as the pope, and valued himſelf not a little on his knowledge in theology: and to his arguments he added threats; telling him, that the Engliſh were but too well diſpoſed to withdraw from the holy ſee; and that if he continued uncomplying, the whole country would readily follow the example of their monarch, who ſhould always deny obedience to a pontiff that had treated him with ſuch falſehood and duplicity. The king even propoſed to his holineſs, whether, if he were not permitted to divorce his preſent queen, he might not have a diſpenſation for having two wives at once?

The pope, perceiving the king's eagerneſs, at laſt ſent cardinal Campegio his legate to London; who, with Wolſey, opened a court for trying the legitimacy of the king's marriage with Catharine, and cited the king and queen to appear before them.

218 Trial of the king and queen before the pope's legate.

The trial commenced the 31ſt of May 1529. Both parties preſented themſelves; and the king anſwered to his name when called: but the queen, inſtead of anſwering to hers, roſe from her ſeat, and throwing herſelf at the king's feet, made a very pathetic harangue; which her dignity, her virtue, and misfortunes, rendered ſtill more affecting. She told her huſband, That ſhe was a ſtranger in his dominions, without protection, without council, and without aſſiſtance; expoſed to all the injuſtice which her enemies were pleaſed to impoſe upon her: That ſhe had quitted her native country, without any other reſource than her connections with him and his family; and that, inſtead of ſuffering thence any violence or iniquity, ſhe had been aſſured of having in them a ſafeguard againſt every misfortune: That ſhe had been his wife during 20 years; and would here appeal to himſelf, whether her affectionate ſubmiſſion to his will had not merited other treatment than to be thus, after ſo long a time, thrown from him with indignity: That ſhe was conſcious,—he himſelf was aſſured,—that her virgin honour was yet unſtained when he received her into his bed; and that her connections with his brother had been carried no farther than the mere ceremony of marriage: That their parents, the kings of England and Spain, were eſteemed the wiſeſt princes of their time, and had undoubtedly acted by the beſt advice when they formed the agreement for that marriage, which was now repreſented as ſo criminal and unnatural: And that ſhe acquieſced in their judgment, and would not ſubmit her cauſe to be tried by a court whoſe dependance on her enemies was too viſible ever to allow her any hopes of obtaining from them an equitable or impartial deciſion. Having ſpoken theſe words, the queen roſe, and, making the king a low reverence, left the court, nor would ſhe ever again appear in it.

The legate having again ſummoned the queen to appear before them, on her refuſal, declared her contumacious, and the trial proceeded in her abſence. But when the buſineſs ſeemed to be nearly decided, Campegio, on ſome very frivolous pretences, prorogued the court, and at laſt transferred the cauſe before the ſee of Rome. Wolſey, in the mean time, whom the king expected to have found a warm favourer and defender of his cauſe, was very irreſolute, and ſeemed to be much in the ſame dilemma with the pope himſelf. He had determined to continue neuter in the diſpute: but this gave great umbrage to the king; who happening about the ſame time to meet with Cranmer, a perſon of equal abilities with Wolſey, and of much leſs cunning, he reſolved to make him ſupply the place of the latter.

219 Wolſey diſgraced.

Crimes are eaſily found againſt a favourite in diſgrace; and whatever errors Wolſey had committed, were repeated by the courtiers with all poſſible exaggerations. On the 18th of October 1529, the dukes of Norfolk and Suffolk were ſent to require the great ſeal from him; and, on his ſcrupling to deliver it without a more expreſs warrant, the king wrote him a letter. Upon this it was immediately ſurrendered, and given by Henry to Sir Thomas More; a man who, beſides the ornaments of elegant literature, poſſeſſed the higheſt virtue, integrity, and capacity. Wolſey was ordered to depart from York-place palace, and all his furniture and plate were appropriated to the king's uſe. The inventory of his goods was found to exceed the moſt extravagant reports. Of fine holland alone, there were found 1000 pieces; the walls of his palace were covered with cloth of gold and ſilver; he had a cupboard of plate of maſſy gold; all the reſt of his riches and furniture were in the ſame proportion. One diſgrace followed another, and his fall was at length completed by a ſummons to London to anſwer a charge of high treaſon.

220
Henry's final quarrel with the pope.

Wolſey at firſt refuſed to anſwer to this ſummons, as being a cardinal: but being at length perſuaded, he ſet out on his journey; but was taken ill, and died by the way *. After his death, the king, by Cranmer's advice, had the legality of his marriage debated in all the univerſities of Europe. The votes of theſe were obtained in his favour by dint of money. The diſburſements made on the occaſion have even been preſerved to this day. To a ſubdeacon he gave a crown, to a deacon two crowns, and ſo to the reſt in proportion to the importance of their ſtation or opinion.—Being thus fortified by the opinions of the univerſities, and even of the Jewiſh rabbies, (for them alſo he had conſulted), Henry began to think he might ſafely oppoſe the pope himſelf. He began by reviving in parliament an old law againſt the clergy, by which all thoſe who had ſubmitted to the authority of the pope's legate were condemned to ſevere penalties. The clergy, to conciliate the king's favour, were obliged to pay a fine of 118,000 pounds. A confeſſion was likewiſe extorted from them, that the king, and not the pope, was the ſupreme head of the church and clergy of England. An act was ſoon after paſſed againſt levying the firſt-fruits, or a year's rent of all the biſhoprics that fell vacant. After this the king married his beloved Anne Boleyn; and ſhe proving with child quickly after marriage, he publicly owned her for his wife, and paſſed with her through London, with a greater magnificence than had ever been known before. The ſtreets were ſtrewed with flowers, the walls of the houſes hung with tapeſtry, and an univerſal joy ſeemed to be diffuſed among the people. The unfortunate queen Catherine, perceiving all further oppoſition to be vain, retired to Amphthill near Dunſtable, where ſhe continued the reſt of her days in privacy and peace.

221
Is declared head of the church.

The pope was no ſooner informed of theſe proceedings, than he paſſed a ſentence, declaring Catherine to be the king's only lawful wife; requiring him to take her again, and denouncing his cenſures againſt him in caſe of a refuſal. Henry, on the other hand, knowing that his ſubjects were entirely at his command, reſolved to ſeparate totally from the church of Rome. In the year 1534, he was declared head of the church by parliament; the authority of the pope was completely aboliſhed in England; all tributes formerly paid to the holy ſee were declared illegal; and the king was entruſted with the collation to all eccleſiaſtical benefices. The nation came into the king's meaſures with joy, and took an oath called the *oath of ſupremacy;* all the credit which the popes had maintained over England for ages, was now overthrown at once; and none ſeemed to repine at the change, except thoſe who were immediately intereſted by their dependence on Rome.

222
Suppreſſion of the monaſteries.

But though the king thus ſeparated from the church of Rome, he by no means adhered to the doctrines of Luther which had been lately publiſhed. He had wrote a book againſt this celebrated reformer, which the pope pretended greatly to admire; and honoured king Henry, on its account, with the title of "Defender of the Faith." This character he ſeemed to be determined to maintain, and therefore perſecuted the reformers moſt violently. Many were burnt for denying the popiſh doctrines, and ſome alſo were executed for maintaining the ſupremacy of the pope. The courtiers knew not which ſide to take, as both the new and old religions were equally perſecuted; and as both parties equally courted the favour of the king, he was by that means enabled to aſſume an abſolute authority over the nation. As the monks had all along ſhewn the greateſt reſiſtance to Henry's eccleſiaſtical character, he reſolved at once to deprive them of the power of injuring him. He accordingly empowered Cromwell, ſecretary of ſtate, to ſend commiſſioners into the ſeveral counties of England to inſpect the monaſteries; and to report, with rigorous exactneſs, the conduct and deportment of ſuch as were found there. This employment was readily undertaken by ſome creatures of the court, whoſe names were Layton, London, Price, Gage, Petre, and Belaſis. They are ſaid to have diſcovered monſtrous diſorders in many of the religious houſes; whole convents of women abandoned to all manner of lewdneſs; friars accomplices in their crimes; pious frauds every where committed, to increaſe the devotion and liberality of the people; and cruel and inveterate factions maintained between the inhabitants. Thus a general horror was excited againſt theſe communities; and therefore the king, in 1536, ſuppreſſed the leſſer monaſteries, amounting to 376 in number. Their revenues, computed at 32,000 pounds a-year, were confiſcated to the king's uſe; beſides their plate and other goods, computed at 100,000 pounds more. In 1538, the greater monaſteries alſo were demoliſhed. The better to reconcile the people to this great innovation, ſtories were publiſhed, perhaps with aggravations, of the deteſtable lives which the friars led in their convents. The reliques alſo, and other objects of ſuperſtitious veneration, were now brought forth, and became objects of deriſion to the reformers. A great number of theſe are enumerated by Proteſtant writers; ſuch as the parings of St Edmund's toes; ſome of the coals that roaſted St Laurence; the girdle of the Virgin Mary, ſhewn in no fewer than eleven different places; two or three heads of St Urſula; the felt of St Thomas of Lancaſter, an infallible cure for the head-ach; part of St Thomas of Canterbury's ſhirt, much reverenced among big-bellied women; ſome reliques, an excellent preſervative againſt rain, others againſt weeds in corn; &c. Some impoſtures, however were diſcovered, which diſplayed a little more ingenuity in the contrivance. At Hales in the county of Gloceſter had been ſhewn, during ſeveral ages, the blood of Chriſt brought from Jeruſalem. The veneration for this precious relique may eaſily be imagined; but it was attended with a moſt remarkable circumſtance not obſerved in any other reliques. The ſacred blood was not viſible to any one in mortal ſin, even when ſet before him; nor could it be diſcovered till he had performed good works ſufficient for his abſolution. At the diſſolution of the monaſtery, the whole contrivance was diſcovered. Two of the monks who were let into the ſecret, had taken the blood of a duck, which they renewed every week: they put it into a phial, one ſide of which was thin and tranſparent cryſtal, the other thick and opaque. When any rich pilgrim arrived, they were ſure to ſhew him the dark ſide, till maſſes and offerings had expiated his offences; after which they made him happy, by turning the phial. —A miraculous crucifix had been kept at Boxely in Kent, and bore the appellation of the *rood of grace*. The lips, eyes, and head of the image, moved on the approach of its votaries. Helſey biſhop of Rocheſter broke the crucifix at St Paul's croſs, and ſhewed to all the people the ſprings and wheels by which it had been ſecretly moved. A great wooden idol, called *Darvel Gatherin*, was alſo brought to London and cut in pieces: and, by a cruel refinement of vengeance, it was employed as fuel to burn friar Foreſt; who was puniſhed for denying the king's ſupremacy, and for ſome pretended hereſies. A finger of St Andrew's, covered with a thin plate of ſilver, had been pawned for a debt of 40 pounds; but as the king's commiſſioners refuſed to releaſe the pawn, people made themſelves very merry with the poor creditor on account of his ſecurity. On this occaſion alſo was demoliſhed the noted ſhrine of Thomas a Becket, commonly called *St Thomas of Canterbury**. The riches of it were inconceivable when broken down; the gold with which it was adorned, filled two large cheſts that eight ſtrong men could ſcarce carry out of the church. The king, on the whole, ſuppreſſed 645 monaſteries, of which 28 had abbots who enjoyed a ſeat in parliament. Ninety colleges were demoliſhed in ſeveral counties; 2374 chantries and free chapels, and 110 hoſpitals. The whole revenue of theſe eſtabliſhments amounted to 161,100 pounds.

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* See *Wolſey.*

222
uppreſſion
f the mo-
aſteries.

It is eaſy to imagine the indignation which ſuch an uninterrupted courſe of ſacrilege and violence would occaſion at Rome. In 1535, the king had executed biſhop Fiſher, who was created a cardinal while in priſon, and Sir Thomas More, for denying or ſpeaking ambiguouſly about his ſupremacy. When this was reported in Italy, numerous libels were publiſhed all over the country, comparing the king of England to Nero, Domitian, Caligula, and the moſt wicked tyrants of antiquity. Clement VII. died about ſix months after he had threatened the king with a ſentence of excommunication; and Paul III. who ſucceeded him in the Papal throne, entertained ſome hopes of an accommodation. But Henry was ſo much accuſtomed to domineering, that the quarrel was ſoon rendered totally incurable. The execution of Fiſher was reckoned ſuch a capital injury, that at laſt the pope paſſed all his cenſures againſt the king, citing him and all his adherents to appear in Rome within 90 days, in order to anſwer for their crimes. If they failed, he excommunicated them; deprived the king of his realm; ſubjected the kingdom to an interdict; declared his iſſue by Ann Boleyn illegitimate; diſſolved all leagues which any Catholic princes had made with him; gave his kingdom to any invader; commanded the nobility to take up arms againſt him; freed his ſubjects from all oaths of allegiance; cut off their commerce with foreign ſtates; and declared it lawful for any one to ſeize them, to make ſlaves of their perſons, and to convert their effects to his own uſe. But though theſe cenſures were then paſſed, they were not openly denounced. The pope delayed the publication till he ſhould find an agreement with England totally deſperate, and till the emperor, who was then hard preſſed by the Turks and the Proteſtant princes of Germany, ſhould be in a condition to carry the ſentence into execution. But in 1538, when news arrived at Rome that Henry had proceeded with the monaſteries as above related, the pope was at laſt provoked to publiſh the cenſures againſt him. Libels were again diſperſed, in which he was anew compared to the moſt furious perſecutors of antiquity, and the preference was now given on their ſide. Henry, it was ſaid, had declared war with the dead, whom the Pagans themſelves reſpected; was at open enmity with heaven; and had engaged in profeſſed hoſtility with all the ſaints and angels. Above all, he was reproached with his reſemblance to the emperor Julian, whom (it was ſaid) he imitated in his apoſtacy and learning, though he fell ſhort of him in his morals. But theſe terrible fulminations had now loſt their effect. Henry had long ago denied the ſupremacy of the pope, and therefore had appealed from him to a general council; but now when a general council was ſummoned at Mantua, he refuſed to be ſubject to it, becauſe it was ſummoned by the pope, and lay entirely under ſubjection to that ſpiritual uſurper. He engaged his clergy to make a declaration to the like purpoſe, and preſcribed to them many other alterations with regard to their ancient tenets and practices. It was expected that the ſpirit of oppoſition to the church of Rome would have at laſt made him fall in with the doctrines of the reformed; but, tho' he had been gradually changing the theological ſyſtem in which he was educated, ever ſince he came to the years of maturity, he was equally poſitive and dogmatical in the few articles he retained, as tho' the whole fabric had continued entire and unſhaken: and though he ſtood alone in his opinion, the flattery of courtiers had ſo much inflamed his tyrannical arrogance, that he thought himſelf entitled to regulate by his own particular ſtandard, the religious faith of the whole nation. The point on which he chiefly reſted his orthodoxy was the moſt abſurd in the whole Popiſh doctrine, namely, that of tranſubſtantiation. All departure from this he held to be a damnable error; and nothing, he thought, could be more honourable for him, than, while he broke off all connexions with the Roman pontiff, to maintain, in this eſſential article, the purity of the Catholic faith.

223
he king
commu-
icated.

224
His abſurd
and tyrannical
conduct.

In 1539, a parliament was called, which met on the 28th day of April. The chancellor opened this parliament by informing the houſe of lords, that it was his majeſty's earneſt deſire to extirpate from his kingdom all diverſity of opinions with regard to religion; and as this enterprize was, he owned, difficult and important, he deſired them to chuſe a committee from among themſelves, who might frame certain articles, and communicate them afterwards to parliament. The lords named the vicar-general, Cromwel now created a peer, the archbiſhops of Canterbury and York, the biſhops of Durham, Carliſle, Worceſter, Bath and Wells, Bangor and Ely. This ſmall committee itſelf

* See *Becket*.

was agitated with ſuch diverſity of opinions, that it could come to no concluſion. The duke of Norfolk then moved, that ſince there was no hopes of having a report from the committee, the articles of faith propoſed to be eſtabliſhed ſhould be reduced to ſix, and a new committee be appointed to frame an act with regard to them. As this peer was underſtood to ſpeak the king's mind, his motion was immediately complied with; and after a ſhort prorogation, the bill of the ſix articles, or the *bloody bill*, as the Proteſtants juſtly termed it, was introduced; and having paſſed the two houſes, received the king's aſſent. By this law the doctrine of the real preſence was eſtabliſhed; the communion in one kind; the perpetual obligation of vows of chaſtity; the utility of private maſſes; the celibacy of the clergy; and the neceſſity of auricular confeſſion. The denial of the real preſence ſubjected the perſon to death by fire, and to the ſame forfeiture as in caſes of treaſon; and admitted not the privilege of abjuring: an unheard of cruelty, unknown even to the inquiſition itſelf. The denial of any of the other articles, even though recanted, was puniſhable by the forfeiture of goods and chattels, and impriſonment during the king's pleaſure: an obſtinate adherence to error, or a relapſe, was adjudged to be felony, and puniſhable by death. The marriage of prieſts was ſubjected to the ſame puniſhment. Their commerce with women, was, for the firſt offence, forfeiture and impriſonment; and for the ſecond, death. Abſtaining from confeſſion, and from receiving the euchariſt at the accuſtomed times, ſubjected the perſon to fine, and to impriſonment during the king's pleaſure; and if the criminal perſevered after conviction, he was puniſhable by death and forfeiture, as in caſes of felony. Commiſſioners were to be appointed by the king for inquiring into theſe hereſies and irregular practices, and the criminals were to be tried by a jury.

225 Law of the ſix articles framed.

The parliament having thus ſurrendered their eccleſiaſtical privileges, next proceeded to ſurrender their civil ones alſo. They gave to the king's proclamations the ſame force as to ſtatutes enacted by parliament, and thus by one blow made a total ſubverſion of the Engliſh conſtitution; and to render the matter worſe, if poſſible, they framed this law as if it were only declaratory, and intended to explain the natural extent of the royal authority.—Notwithſtanding this, however, they afterwards pretended to make ſome limitations in the regal power; and they enacted, that no proclamation ſhould deprive any perſon of his lawful poſſeſſions, liberties, inheritances, &c. nor yet infringe any common law or laudable cuſtom of the realm.

As ſoon as the act of the ſix articles had paſſed, the Catholics were extremely vigilant to inform againſt offenders; and, in a ſhort time, no fewer than 500 perſons were thrown into priſon. But ſome of the chief officers of ſtate remonſtrating againſt the cruelty of puniſhing ſuch a number of delinquents, they were all of them ſet at liberty; and ſoon after this, Henry, as if he had reſolved to give each party the advantage by turns, granted every one permiſſion to have a tranſlation of the Bible, which had been newly made, in his family.

In 1540, the king again complained to parliament of the great diverſity of religious tenets which ſtill prevailed among his ſubjects; a grievance, he affirmed, which ought the leſs to be endured, becauſe the Scriptures were now publiſhed in England, and ought univerſally to be the ſtandard of belief to mankind. But he had appointed, he ſaid, ſome biſhops and divines to draw up a liſt of tenets; and he was determined that Chriſt and the truth ſhould have the victory. The king ſeems to have expected more from this new book of his doctors, than had enſued from the publication of the Scriptures. Cromwel, as vicar-general, alſo made a ſpeech in the upper houſe; and the peers in return told him, that he deſerved to be vicar-general to the univerſe: To ſuch a degree of mean and ſervile ſubmiſſion was the Engliſh parliament at this time reduced.

226 Suppreſſion of the knights of Malta.

This year alſo the king ſuppreſſed the only religious order remaining in England; namely, the knights of St John of Jeruſalem, or the *knights of Malta*, as they are commonly called. This order had by their valour done great ſervice to Chriſtendom; and had very much retarded, at Jeruſalem, Rhodes, and Malta, the rapid progreſs of the barbarians. During the general ſurrender of the religious houſes in England, they had obſtinately refuſed to give up their revenues to the king; and Henry, who would endure no ſociety that profeſſed obedience to the pope, was obliged to have recourſe to parliament for the diſſolution of this order. Their revenues were large, and formed a conſiderable addition to the acquiſitions which the king had already made. But he had been ſuch a bad œconomiſt, that, notwithſtanding the immenſe plunder afforded him by the church, he now demanded from parliament a very conſiderable ſupply. The commons, however, though laviſh of the blood of their fellow-ſubjects, were extremely frugal of their money; and it was not without murmuring that the grant could be obtained, even by this abſolute and dreaded monarch.

The king all this time continued to puniſh with unrelenting ſeverity the Proteſtants who offended againſt the law of the ſix articles, and the Papiſts who denied his ſupremacy. This gave occaſion to a foreigner at that time to ſay, that thoſe who were againſt the pope were burned, and thoſe who were for him were hanged. The king even ſeemed to diſplay in an oſtentatious manner his tyrannical juſtice and impartiality which reduced both parties to ſubjection. This year he executed three Proteſtants and three Papiſts coupled together. The latter declared, that the moſt grievous part of their puniſhment was the being coupled to ſuch heretical miſcreants as ſuffered with them.

227 And of many colleges, hoſpitals, &c.

In 1542, Henry proceeded to the further diſſolution of colleges, hoſpitals, and other foundations of that nature. The courtiers had been dealing with the preſidents and governors to make a ſurrender of their revenues to the king; and they had ſucceeded with eight. But there was an obſtacle to their farther progreſs: it had been provided by the local ſtatutes of moſt of theſe foundations, that no preſident nor any fellows could make ſuch a deed without the unanimous conſent of all the fellows. This conſent would not have been eaſily obtained; but the parliament proceeded in a ſummary manner to annul all theſe ſtatutes; by which means the revenues of thoſe houſes were expoſed to the rapacity of the king and his favourites. Henry alſo now extorted from many biſhops a ſurrender of their chapter-lands; by which means he pillaged the ſees of Canterbury, York, and London, and enriched his favourites with their ſpoils. He engaged the parliament to mitigate the penalties of the ſix articles, as far as regarded the marriage of prieſts, which was now only ſubjected to a forfeiture of goods, chattels, and lands during life: he was ſtill equally bent on maintaining a rigid purity in ſpeculative principles. He had appointed a commiſſion conſiſting of two archbiſhops and ſeveral biſhops of both provinces, together with a conſiderable number of doctors of divinity; and by virtue of his eccleſiaſtical ſupremacy he had charged them to chooſe a religion for his people. Before the commiſſioners, however, had made any progreſs in this arduous undertaking, the parliament had paſſed a law by which they ratified all the tenets which theſe divines ſhould eſtabliſh with the king's conſent; and thus they were not aſhamed of declaring expreſsly that they took their religion upon truſt, and had no other rule either in religious or temporal concerns than the arbitrary will of their maſter. One clauſe of the ſtatute, however, ſeems to ſavour ſomewhat of the ſpirit of liberty. It was enacted, that the eccleſiaſtical commiſſioners ſhould eſtabliſh nothing repugnant to the laws and ſtatutes of the realm. But in reality this proviſo was inſerted by the king, to ſerve his own purpoſes. By introducing a confuſion and contradiction into the laws, he became more the maſter of every one's life and property; and as the ancient independence of the church ſtill gave him jealouſy, he was well pleaſed, under cover of ſuch a clauſe, to introduce appeals from ſpiritual to civil courts. For the ſame reaſon he would never promulgate a body of canon law; and he encouraged the judges on all occaſions to interpoſe in eccleſiaſtical cauſes, wherever they thought the law or the prerogative concerned. Being thus armed by the authority of parliament, or rather by their acknowledgement of his ſpiritual ſupremacy, the king employed his commiſſioners to ſelect a ſyſtem of tenets for the aſſent and belief of the nation. A ſmall volume was publiſhed, under the title of *The Inſtitution of a Chriſtian Man*, which was received by the convocation, and made the infallible ſtandard of orthodoxy. In this book the points of juſtification, faith, free-will, good-works, and grace, were diſcuſſed in a manner ſomewhat favourable to the opinions of the reformers. The ſacraments, which a few years before were only allowed to be three, were now increaſed to ſeven, conformably to the ſentiments of the Catholics. Throughout the whole of this book the king's caprice is very diſcernible; and the book is in reality to be regarded as his compoſition. For Henry, while he made his opinion a rule for the nation, would himſelf ſubmit to no authority whatever; not even to any which he had formerly eſtabliſhed. The ſame year the people had a farther inſtance of the king's inconſiſtency. He ordered a new book to be compoſed, called the *Erudition of a Chriſtian man*; and without aſking the conſent of the convocation, he publiſhed by his own authority this new model of orthodoxy. He was no leſs poſitive in his new creed than he had been in the old one; but though he required the faith of the nation to veer about at his ſignal, he was particularly careful to inculcate the doctrine of paſſive obedience in all his books, and he was no leſs careful to retain the nation in the practice.

228
Extreme
bſurdity of
he king's
onduct.

But while the king was thus ſpreading his own books among the people, both he and the clergy ſeem to have been very much perplexed with regard to the Scriptures. A review had been made by the eccleſiaſtical ſynod of the new tranſlation of the Bible; and biſhop Gardiner had propoſed, that, inſtead of employing Engliſh expreſſions throughout, ſeveral Latin words ſhould ſtill be preſerved, becauſe they contained, as he pretended, ſuch peculiar energy and ſignificance, that they had no correſpondent terms in the Engliſh tongue. Among theſe were *eccleſia*, *pœnitentia*, *pontifex*, *contritus*, &c. But as this mixture would appear extremely barbarous, and was plainly calculated for no other purpoſe than to retain the people in their ancient ignorance, the propoſal was rejected. The knowledge of the people, however, ſeemed to be ſtill more dangerous than their ignorance; and the king and parliament, ſoon after the publication of the Scriptures, retracted the conceſſion which they had formerly made, and prohibited all but gentlemen and merchants to peruſe them. Even that liberty was not granted without an apparent heſitation, and dread of the conſequences. Theſe perſons were allowed to read, *ſo it be done quietly and with good order*. And the preamble to the act ſets forth, "That many ſeditious and ignorant perſons had abuſed the liberty granted them of reading the Bible; and that great diverſity of opinion, animoſities, tumults, and ſchiſms, had been occaſioned by perverting the ſenſe of the Scriptures." The maſs-book alſo paſſed under the king's examination; but little alteration was yet made in it. Some doubtful or fictitious ſaints only were ſtruck out; and the name of the pope was eraſed. The latter precaution was alſo uſed with every new book that was printed, and even every old one that was ſold. The word *pope* was carefully omitted or blotted out; as if that precaution could aboliſh the term from the language, or cauſe the people forget that ſuch a perſon exiſted. About this time alſo, the king prohibited the acting of plays, interludes, and farces, in deriſion of the popiſh ſuperſtitions; which the Proteſtants had been in uſe to practiſe: and this prohibition was in the higheſt degree pleaſing to the Roman Catholics.

In this tyrannical and head-ſtrong manner Henry proceeded with regard to eccleſiaſtical affairs. In other reſpects his conduct was equally violent. With regard to his domeſtic concerns, hiſtory ſcarce affords his parallel; for an account of which, ſee the biographical article HENRY.

229
Attainder
of Norfolk
and Surry.

The laſt inſtances of the king's injuſtice and cruelty were the duke of Norfolk and his ſon the earl of Surry. The former had ſerved the king with fidelity, and the latter was a young man of the moſt promiſing hopes. His qualifications, however, were no ſecurity againſt the violence of Henry's temper. He had dropped ſome expreſſions of reſentment againſt the king's miniſters, who had diſplaced him from the government of Boulogne; and the whole family had become obnoxious on account of the late queen Catherine Howard. From theſe motives, orders were given to arreſt both the father and ſon; and accordingly they were arreſted both on the ſame day, and confined to the tower. The ducheſs dowager of Richmond, Surry's own ſiſter, was among the number of his accuſers; and Sir Richard Southwell alſo, his moſt intimate friend, charged him with infidelity to the king. Surry denied the charge, and challenged his accuſer to a ſingle combat. This favour was denied him; and, notwithſtanding his eloquent and ſpirited defence, he was condemned and executed at Tower-hill.—The duke of Norfolk vainly endeavoured to mollify the king by letters and ſubmiſſions. An attainder was found againſt him, though the only crime his accuſers could allege was, that he had once ſaid that the king was ſickly, and could not hold out long; and that the kingdom was likely to be torn between the contending parties of different perſuaſions. Cranmer, though engaged for many years in an oppoſite party to that of Norfolk, and though he had received many and great injuries from him, would have no hand in ſuch an unjuſt proſecution; but retired to his ſeat at Croydon. The death-warrant, however, was made out, and immediately ſent to the lieutenant of the tower; but a period was put to the cruelties and violence of the king by his death, which happened on the 14th of January 1547, the night before Norfolk was to have been executed.

230 Henry dies, and is ſucceeded by Edward VI.

Henry was ſucceeded by his only ſon Edward, a boy of nine years of age. The moſt remarkable tranſactions of his reign are thoſe with regard to religion. The reſtraint which Henry VIII. had laid upon the proteſtants was now taken off; and they not only maintained their doctrines openly, but ſoon became the prevailing party. Henry had fixed the majority of his ſon at 18 years of age; and, in the mean time, appointed 16 executors of his will, to whom, during the minority, he entruſted the government of the king and kingdom. This will, he imagined, would be obeyed as implicitly after his death as though he had been alive. But the firſt act of the executors was to chuſe the earl of Hertford, afterwards duke of Somerſet, protector of the realm; and in him was lodged all the regal power, together with a privilege of naming whom he pleaſed for his privy council.

231 Reformation completed.

The duke of Somerſet had long been reckoned a ſecret partizan of the reformers; and, immediately on his elevation to his preſent high dignity, began to expreſs his intention of reforming the abuſes of the ancient religion. Under his direction and that of Cranmer, therefore, the reformation was carried forward and completed; ſo that the religion of the Engliſh became almoſt what it is at preſent.—The only perſon of conſequence who oppoſed the reformers was Gardiner biſhop of Wincheſter; and, to the diſgrace of their own principles, the reformers now ſhewed that they could perſecute as ſeverely as the papiſts had formerly perſecuted them.

232 The reformers perſecute the catholics.

Gardiner was committed to the Fleet priſon, where he was treated with great ſeverity. He was afterwards ſent to the tower; and having continued there two years, he was commanded to ſubſcribe ſeveral articles, among which was one confeſſing the juſtice of his own impriſonment. To all the articles but this he agreed to ſubſcribe; but that did not give ſatisfaction. He was then committed to cloſe cuſtody; his books and papers were ſeized; all company was denied him, and he was not even permitted the uſe of pen and ink. The biſhops of Chicheſter, Worceſter, and Exeter, were in like manner deprived of their offices; but the biſhops of Landaff, Saliſbury, and Coventry, eſcaped by ſacrificing the moſt conſiderable ſhare of their revenues. The libraries of Weſtminſter and Oxford were ordered to be ranſacked, and purged of the Romiſh legends, miſſals, and other ſuperſtitious volumes; in which ſearch, great devaſtation was made even in uſeful literature. Many volumes claſped in ſilver were deſtroyed for the ſake of their rich bindings; many of geometry and aſtronomy were ſuppoſed to be magical, and deſtroyed on that account; while the members of the univerſity, unable to put a ſtop to theſe ravages, trembled for their own ſafety.

The reformers, however, were not contented with ſeverities of this kind. A commiſſion was granted to the primate and others, to ſearch after all Anabaptiſts, heretics, or contemners of the new liturgy. Among the numbers who were found guilty upon this occaſion, was one Joan Boucher, commonly called *Joan of Kent;* who was ſo very obſtinate, that the commiſſioners could make no impreſſion upon her. She maintained an abſtruſe metaphyſical ſentiment, that Chriſt, as man, was a ſinful man; but, as the Word, he was free from ſin, and could be ſubject to none of the frailties of the fleſh with which he was clothed. For maintaining this doctrine, the poor woman was condemned to be burnt to death as an heretic. The young king, who it ſeems had more ſenſe than his teachers, refuſed at firſt to ſign the death-warrant: but, at laſt, being overcome by the importunities of Cranmer, he reluctantly complied; declaring, that if he did wrong, the ſin ſhould be on the head of thoſe who had perſuaded him to it. The primate, after making another unſucceſsful effort, to reclaim the woman from her opinions, committed her to the flames. Some time after, one Van Paris, a Dutchman, was condemned to death for Arianiſm. He ſuffered with ſo much ſatisfaction, that he hugged and careſſed the faggots that were conſuming him.

The reſt of this reign affords only the hiſtory of intrigues and cabals of the courtiers one againſt another. The protector was firſt oppoſed by his own brother admiral Sir Thomas Seymour, who had married Catharine Par, the late king's widow. She died ſoon after the marriage; and he then made his addreſſes to the princeſs Elizabeth, who is ſaid not to have been averſe to the match. His brother the duke, however, who was at that time in the north, being informed of his ambitious projects, ſpeedily returned, had him attainted of high treaſon, and at laſt condemned and executed. The duke of Somerſet himſelf, however, was ſome time afterwards deprived of his office by Dudley duke of Northumberland; who at laſt found means to get him accuſed of high treaſon, and executed.

233 Lady Jane Gray declared heir to the crown.

Not ſatisfied with the office of Protector, which he aſſumed on the death of Somerſet, this ambitious nobleman formed a ſcheme of engroſſing the ſovereign power altogether. He repreſented to Edward, who was now in a declining ſtate of health, that his ſiſters Mary and Elizabeth, who were appointed by Henry's will to ſucceed, in failure of direct heirs, to the crown, had both been declared illegitimate by parliament; that the queen of Scots his aunt, ſtood excluded by the king's will, and, being an alien alſo, loſt all right of ſucceeding. The three princeſſes being thus excluded, the ſucceſſion naturally devolved to the marchioneſs of Dorſet eldeſt daughter of the French queen, Henry's ſiſter, who had married the earl of Suffolk, after her firſt huſband's death. The next heir to the marchioneſs was the Lady Jane Gray, a lady univerſally reſpected, both on account of the charms of her perſon, and the virtues and endowments of her mind. The king, who was accuſtomed to ſubmit to the politic views of this miniſter, agreed to have the ſucceſſion ſubmitted to council, where Northumberland hoped to procure an eaſy concurrence. The judges, however, who were appointed to draw up the king's letters patent for this purpoſe, warmly objected to the meaſure; and gave their reaſons before the council. They begged that a parliament might be ſummoned, both to give it force, and to free its partiſans from danger: they ſaid that the form was invalid, and would not only ſubject the judges who drew it, but every counſellor who ſigned it, to the pains of treaſon. Northumberland could not brook their demurs; he threatened them with his authority, called one of them a *traitor*, and ſaid he would fight with any man in his ſhirt in ſuch a juſt cauſe as that of Lady Jane's ſucceſſion. A method was therefore found out of ſcreening the judges from danger, by granting them the king's pardon for what they ſhould draw up; and at length the patent for changing the ſucceſſion was compleated, the princeſſes Mary and Elizabeth were ſet aſide, and the crown ſettled on the heirs of the ducheſs of Suffolk (for ſhe herſelf was contented to forego her claim.)

For ſome time the king had languiſhed in a conſumption. After this ſettlement of the crown, his health viſibly declined every day, and little hopes were entertained of his recovery. To make matters worſe, his phyſicians were diſmiſſed by Northumberland's advice, and by an order of council; and he was put into the hands of an ignorant old woman, who undertook in a little time to reſtore him to health. After the uſe of her medicines all his bad ſymptoms increaſed to the moſt violent degree. He felt a difficulty of ſpeech and breathing; his pulſe failed, his legs ſwelled, his colour became livid, and many other ſigns of approaching death made their appearance. He expired at Greenwich on the 6th of July 1553, in the 16th year of his age and 7th of his reign.

234
Death of
Edward VI.

After the death of king Edward, very little regard was paid to the new patent by which Lady Jane Gray had been declared heir to the throne. The undoubted title of Mary, notwithſtanding the ſcandalous behaviour of her father and his ſervile parliaments, was acknowledged by the whole nation. Northumberland, however, was reſolved to put the late king's will in execution. He therefore carefully concealed the death of Edward, in hopes of ſecuring the perſon of Mary, who by an order of council had been required to attend her brother during his illneſs; but ſhe being informed of his death, immediately prepared to aſſert her right to the crown. Northumberland then, accompanied by the duke of Suffolk, the earl of Pembroke, and ſome other noblemen, ſaluted Lady Jane Gray queen of England. Jane was in a great meaſure ignorant of theſe tranſactions, and it was with the utmoſt difficulty ſhe was perſuaded to accept of the dignity conferred upon her. At laſt ſhe complied, and ſuffered herſelf to be conveyed to the tower, where it was then uſual for the ſovereigns of England to paſs ſome days after their acceſſion. Mary, however, who had retired to Kenning-hall in Norfolk, in a very few days found herſelf at the head of 40,000 men; and Lady Jane reſigned the ſovereignty in ten days, with much more pleaſure than ſhe had received it. She retired with her mother to their own habitation; and Northumberland finding his affairs quite deſperate, attempted to quit the kingdom. But he was ſtopped by the band of penſioner guards, who informed him that he muſt ſtay to juſtify their conduct in taking arms againſt their lawful ſovereign. He therefore ſurrendered himſelf to Mary, and was ſoon after executed, together with Sir John Gates, and Sir Thomas Palmer, two infamous tools of his power. Sentence was alſo pronounced againſt Lady Jane Gray and her huſband Lord Guildford; but without any intention of putting it in execution againſt them at preſent, as their youth and innocence pleaded ſo ſtrongly in their favour, neither of them having yet reached their 17th year.

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236
Mary declared
queen.

Mary now entered London, and was peaceably ſettled on the throne without any effuſion of blood. The Engliſh, however, ſoon found reaſon to repent their attachment to her cauſe. Though ſhe had at firſt ſolemnly promiſed to defend the religion and laws of her predeceſſor, ſhe no ſooner ſaw herſelf firmly eſtabliſhed on the throne, than ſhe reſolved to reſtore the Popiſh religion, and give back their former power to the clergy. Gardiner, Bonnar, and the other biſhops who had been impriſoned or ſuffered loſs during the laſt reign, were taken from priſon, reinſtated in their ſees, and now triumphed in their turn. On pretence of diſcouraging controverſy, the queen by her prerogative ſilenced all preachers throughout England, except ſuch as ſhould obtain a particular licenſe, and this ſhe was reſolved to give only to thoſe of her own perſuaſion. The greater part of the foreign Proteſtants took the firſt opportunity of leaving the kingdom; and many of the arts and manufactures, which they had ſucceſsfully introduced, fled with them. Soon after the queen called a parliament, which ſeemed willing to concur in all her meaſures. They at once repealed all the ſtatutes with regard to religion, that had paſſed during the reign of Edward VI. and the national religion was again placed on the ſame footing in which it had been at the death of Henry VIII.

237
Marries
Philip of
Spain.

The queen's miniſters being now willing to ſtrengthen her power by a Catholic alliance, looked out for a proper huſband to the queen. The perſon pitched upon, and whom the queen married, was Philip prince of Spain, and ſon of the emperor Charles V. In order to render this match as little diſagreeable to the people as poſſible, the articles of marriage were drawn as favourable to their intereſts and honour as the nature of the thing would admit. It was agreed, that though Philip ſhould have the title of king, the adminiſtration of government ſhould be entirely in hands of the queen; that no foreigner ſhould be capable of enjoying any office in the kingdom; that no innovation ſhould be made in the Engliſh laws, cuſtoms, and privileges; that the queen's iſſue ſhould inherit, together with England, Burgundy and the Low Countries; and that if Don Carlos, Philip's ſon by a former marriage, ſhould die, the children of queen Mary ſhould then enjoy all the dominions poſſeſſed by king Philip.

238
Wyat's inſurrection.

Notwithſtanding all theſe precautions, however, Mary's alliance with Philip filled the whole nation with diſcontent. Sir Thomas Wyatt, a Roman Catholic, at the head of 4000 inſurgents, marched from Kent to Hyde Park, publiſhing, as he went forward, a declaration againſt the queen's evil counſellors, and againſt the Spaniſh match. His firſt aim was to ſecure the tower; but his temerity proved his ruin. As he marched through the city of London, and among the narrow ſtreets, without ſuſpicion, care was taken by the earl of Pembroke, to block up the way behind him by ditches and chains thrown acroſs, and guards placed at the avenues, to prevent his return. Wyatt paſſed on, and ſuppoſed himſelf ready to reap the fruits of his undertaking; when, to his utter confuſion, he found he could neither go forward nor retreat; ſo that he was obliged to ſurrender at diſcretion. Some other inſurrections were formed; but all of them were eaſily ſuppreſſed, and the principal conſpirators executed. The queen was now determined to remove every perſon of whom there could be the leaſt cauſe of ſuſpicion. Lady Jane Gray and her huſband were both ordered to prepare for death. The place intended at firſt for their execution was without the tower; but their youth, beauty, and innocence, being likely to raiſe an inſurrection among the people, orders were given that they ſhould be executed within the verge of the tower *.

239 Execution of lady Jane Gray and her huſband.

* See *Gray*.

The enemies of the ſtate being thus ſuppreſſed, thoſe of the Catholic religion were next perſecuted. The old ſanguinary laws which had been rejected by a former parliament, were now revived. Orders were given, that the prieſts and biſhops who had married ſhould be ejected; that the maſs ſhould be reſtored; the pope's authority eſtabliſhed; and that the church and its privileges, all but their goods and eſtates, ſhould be put on the ſame footing on which they were before the commencement of the reformation. But as the gentry and nobility had already divided the church-lands among them, it was thought inconvenient, and indeed impoſſible, to make a reſtoration of theſe. The perſons who chiefly promoted theſe meaſures were Gardiner biſhop of Wincheſter, and cardinal Pole, who was a kinſman of Henry VIII's, but had been long in Italy, and was now returned from it. The latter was for tolerating the Proteſtants; but the former, perceiving that rigorous meaſures would be moſt agreeable to the king and queen, declared himſelf againſt it. He was too prudent, however, to appear in perſon at the head of the perſecution; and therefore conſigned that office to Bonner biſhop of London, a man of a very abandoned character. The bloody ſcene began by the execution of Hooper biſhop of Gloceſter, and Rogers prebendary of St Paul's. Theſe were quickly followed by others, of whom the principal were archbiſhop Cranmer, Ridley biſhop of London, and Latimer biſhop of Worceſter *. Theſe perſecutions ſoon became odious to the whole nation, and the perpetrators of them were all willing to throw the blame from themſelves upon others. Philip endeavoured to faſten the whole reproach upon Bonner; but that biſhop would not take the whole, and therefore retorted on the court. A bold ſtep was now taken to introduce a court ſimilar to the Spaniſh inquiſition, that ſhould be empowered to try heretics, and condemn them without any other law but its own authority. But even this was thought a method too dilatory in the preſent exigence of affairs. A proclamation iſſued againſt books of hereſy, treaſon, and ſedition, declared, that whoſoever had ſuch books in his poſſeſſion, and did not burn them without reading, ſhould ſuffer as a rebel. This was attended with the execution of ſuch numbers, that at laſt the magiſtrates who had been inſtrumental in theſe cruelties, refuſed to give their aſſiſtance any longer. It was computed, that, during this perſecution, 277 perſons ſuffered by fire, beſides thoſe puniſhed by impriſonments, fines, and confiſcations. Among thoſe who ſuffered by fire were five biſhops, 21 clergymen, eight lay-gentlemen, 84 tradeſmen, 100 huſbandmen, 55 women, and four children.

240 Proteſtants perſecuted.

* See *Cranmer*, &c.

The only remarkable tranſaction which happened during this reign with regard to the temporal affairs of the kingdom was the loſs of Calais, which had been in the poſſeſſion of the Engliſh for upwards of 200 years *. This loſs filled the whole kingdom with complaints, and the queen with grief. She was heard to ſay, that, when dead, the name of *Calais* would be found engraven on her heart. She did not long ſurvive this loſs; but died in the year 1558, of a lingering illneſs, after a reign of five years four months and eleven days.

* See *Calais*.

241 Mary dies, and is ſucceeded by Elizabeth.

After the death of Mary, the princeſs Elizabeth ſucceeded to the throne without oppoſition. She was at Hatfield when news of her ſiſter's death were brought her; upon which ſhe haſtened up to London, where ſhe was received with great joy. This princeſs was well qualified for government. She had judgment ſufficient to make choice of proper miniſters, and authority enough to keep her ſubjects in awe. The reſtraints alſo, to which ſhe had been ſubjected during her ſiſter's reign, had taught her ſo well to conceal her ſentiments, that ſhe had become a perfect miſtreſs of diſſimulation; which, though no commendable part of her character, proved occaſionally of great ſervice to her government. She perfected the reformation, and put the religion of England upon the ſame plan which ſubſiſts at preſent. This was accompliſhed without the leaſt difficulty; for the perſecutions in Mary's reign had ſerved only to give the whole nation an averſion for popery. In the time of Edward VI. the people had been compelled to embrace the Proteſtant religion, and their fears induced them to conform; but now, almoſt the whole nation were Proteſtants from inclination. The reformation was confirmed by act of parliament in 1559, and thus England was ſeen to change its religion four times in the ſpace of 32 years.

For many years of queen Elizabeth's reign nothing remarkable occurs, except her ungenerous and cruel treatment of Mary queen of Scots, who had fled into her dominions for protection from her own ſubjects. On the 11th of November 1586, this unfortunate princeſs was executed, under pretence of having engaged herſelf in a conſpiracy againſt the queen of England; for an account of which, ſee the articles MARY and SCOTLAND. In a ſhort time after her execution, Elizabeth found herſelf in a much greater danger than what could have ariſen from the machinations of Mary. Philip of Spain, who had long meditated the deſtruction of England, and who by his extenſive power ſeemed to have reaſonable grounds to hope for ſucceſs, began now to put his projects in execution. The perpetual object of his ſchemes was to ſupport the Catholic religion and exterminate the reformation. The revolt of the Dutch, who about this time broke off from Spain, ſtill more inflamed

242 Projected invaſion from Spain.

inflamed his reſentment againſt the Engliſh, as they had encouraged that inſurrection and aſſiſted the revolters. He had, therefore, for ſome time, been making preparations to attack England by a powerful invaſion; and now every part of his vaſt empire reſounded with the noiſe of armaments, and every art was uſed to levy ſupplies for that great deſign. The marquis of Santa Croce, a ſea-officer of great reputation and experience, was deſtined to command the fleet, which conſiſted of 130 veſſels, of a greater ſize than any that had been hitherto ſeen in Europe. The duke of Parma was to conduct the land-forces, 20,000 of whom were on board the fleet, and 34,000 more were aſſembled in the Netherlands, ready to be tranſported into England. The moſt renowned nobility and princes of Italy and Spain were ambitious of ſharing in the honour of this great enterprize. Don Amadæus of Savoy, Don John of Medicis, Gonzago duke of Sabionetta, and others, haſtened to join this great equipment; no doubt was entertained of its ſucceſs, and it was oſtentatiouſly ſtyled the *invincible armada*. It carried on board, beſides the land-forces, 8400 mariners, 2000 galley-ſlaves, and 2630 great pieces of braſs ordnance. It was victualled for ſix months; and was attended with 20 leſſer ſhips, called *caravals*, having 10 ſlaves, and ſix oars a-piece.

Nothing could exceed the terror and conſternation which all ranks of people felt in England upon the news of this terrible armada being under ſail to invade them. A fleet of not above 30 ſhips of war, and thoſe very ſmall, in compariſon, was all that was to oppoſe it by ſea; and as for reſiſtance by land, that was ſuppoſed to be impoſſible, as the Spaniſh army was compoſed of men well diſciplined, and long inured to danger. The queen alone ſeemed undiſmayed in this threatening calamity; ſhe iſſued all her orders with tranquillity; animated her people to a ſteady reſiſtance; and the more to excite the martial ſpirit of the nation, appeared on horſeback in the camp at Tilbury, exhorting the ſoldiers to their duty, and promiſing to ſhare the ſame dangers and the ſame fate with them. "I myſelf, (cried ſhe), will be your general, your judge, and the rewarder of every one of your virtues in the field. Your alacrity has already deſerved its rewards; and on the word of a prince they ſhall be duly paid you. Perſevere then in your obedience to command; ſhew your valour in the field; and we ſhall ſoon have a glorious victory over thoſe enemies of my God, my kingdom, and my people." The ſoldiers with ſhouts proclaimed their ardour, and only wiſhed to be led on to conqueſt.

242 Projected invaſion from Spain.

Nor were her preparations by ſea carried on with leſs alacrity; although the Engliſh fleet was much inferior in number and ſize of ſhipping to that of the enemy, yet it was much more manageable, the dexterity and courage of the mariners being greatly ſuperior. Lord Howard of Effingham, a man of great courage and capacity, as lord high admiral took upon him the command of the navy. Drake, Hawkins, and Forbiſher, the moſt renowned ſeamen in Europe, ſerved under him; while a ſmall ſquadron conſiſting of 40 veſſels, Engliſh and Flemiſh, commanded by lord Seymour, lay off Dunkirk, in order to intercept the duke of Parma. Such were the preparations made by the Engliſh, while all the Proteſtant powers of Europe regarded this enterprize as the critical event which was to decide for ever the fate of their religion.

243 Deſtruction of the Spaniſh armada.

In the mean time, while the Spaniſh armada was preparing to ſail, the admiral Santa Croce died, as likewiſe the vice-admiral Paliano; and the command of the expedition was given to the duke de Medina Sidonia, a perſon utterly unexperienced in ſea-affairs; and this, in ſome meaſure, ſerved to fruſtrate the deſign. But ſome other accidents alſo contributed to its failure. Upon leaving the port of Liſbon, the armada next day met with a violent tempeſt, which ſunk ſome of the ſmalleſt of their ſhipping, and obliged the fleet to put back into harbour. After ſome time ſpent in refitting, they again put to ſea; where they took a fiſherman, who gave them intelligence that the Engliſh fleet, hearing of the diſperſion of the armada in a ſtorm, was retired back into Plymouth harbour, and moſt of the mariners diſcharged. From this falſe intelligence, the Spaniſh admiral, inſtead of going directly to the coaſt of Flanders, to take in the troops ſtationed there, as he had been inſtructed, reſolved to ſail to Plymouth, and deſtroy the ſhipping laid up in that harbour. But Effingham, the Engliſh admiral, was very well prepared to receive them; he was juſt got out of port when he ſaw the Spaniſh armada coming full ſail towards him, diſpoſed in the form of an half-moon, and ſtretching ſeven miles from one extremity to the other. However, the Engliſh admiral, ſeconded by Drake, Hawkins, and Forbiſher, attacked the armada at a diſtance, pouring in their broadſides with admirable dexterity. They did not chooſe to engage the enemy more cloſely, becauſe they were greatly inferior in the number of ſhips, guns, and weight of metal; nor could they pretend to board ſuch lofty ſhips without manifeſt diſadvantage. However, two Spaniſh galleons were diſabled and taken. As the armada advanced up the channel, the Engliſh ſtill followed and infeſted their rear; and their fleet continually increaſing from different ports, they ſoon found themſelves in a capacity to attack the Spaniſh fleet more nearly; and accordingly fell upon them, while they were as yet taking ſhelter in the port of Calais. To increaſe their confuſion, Howard took eight of his ſmaller ſhips, and filling them with combuſtible materials, ſent them, as if they had been fire-ſhips, one after the other into the midſt of the enemy. The Spaniards, taking them for what they ſeemed to be, immediately took flight in great diſorder; while the Engliſh, profiting by their panic, took or deſtroyed about 12 of their ſhips.

This was a fatal blow to Spain. The duke de Medina Sidonia being thus driven to the coaſt of Zealand, held a council of war, in which it was reſolved, that as their ammunition began to fail, as their ſhips had received great damage, and the duke of Parma had refuſed to venture his army under their protection, they ſhould return to Spain by ſailing round the Orkneys, as the wind was contrary to his paſſage directly back. Accordingly they proceeded northward, and were followed by the Engliſh fleet as far as Flamborough head, where they were terribly ſhattered by a ſtorm. Seventeen of the ſhips, having 5000 men on board, were afterwards caſt away upon the Weſtern iſles, and the coaſt of Ireland. Of the whole armada, 53 ſhips only returned to Spain, in a miſerable condition; and the ſeamen as well as ſoldiers who remained, only ſerved, by their accounts, to intimidate their countrymen from attempting to renew ſo dangerous an expedition.

Theſe diſaſters of the Spaniſh armada, ſerved only to excite the ſpirit and courage of the Engliſh to attempt invaſions in their turn. It would be endleſs to relate all the advantages obtained over the enemy at ſea, where the capture of every ſhip muſt have made a ſeparate narrative. It is ſufficient to obſerve, that the ſea-captains of that reign are ſtill conſidered as the boldeſt and moſt enterprizing ſet of men that England ever produced; and among this number, we are to reckon Raleigh and Howard, Drake, Cavendiſh, and Hawkins. The Engliſh navy then began to take the lead; and has ſince continued irreſiſtible in all parts of the ocean.

244 Elizabeth's grief for the execution of Eſſex.

Elizabeth continued to reign with great glory till the year 1603; but all her greatneſs could not prevent her from being extremely miſerable before her death. She had cauſed her greateſt favourite, and probably her lover, the earl of Eſſex * to be executed. Though this execution could not be called unjuſt, the queen's affection (on being informed that he had at laſt thrown himſelf entirely on her clemency) returned to ſuch a degree, that ſhe thenceforth gave herſelf entirely over to deſpair. She refuſed food and ſuſtenance; ſhe continued ſilent, and gloomy; ſighs and groans were the only vent ſhe gave to her deſpondence; and ſhe lay for ten days and nights upon the carpet, leaning on cuſhions, which her maids brought her. Perhaps the faculties of her mind were impaired by long and violent exerciſe; perhaps ſhe reflected with remorſe on ſome paſt actions of her life, or perceived, but too ſtrongly, the decays of nature, and the approach of her diſſolution. She ſaw her courtiers remitting in their aſſiduity to her, in order to pay their court to James the apparent ſucceſſor. Such a concurrence of cauſes was more than ſufficient to deſtroy the remains of her conſtitution; and her end was now viſibly ſeen to approach. Feeling a perpetual heat in her ſtomach, attended with an unquenchable thirſt, ſhe drank without ceaſing, but refuſed the aſſiſtance of her phyſicians. Her diſtemper gaining ground, Cecil, and the lord admiral, deſired to know her ſentiments with regard to the ſucceſſion. To this ſhe replied, that, as the crown of England had always been held by kings, it ought not to devolve upon any inferior character, but upon her immediate heir the king of Scotland. Being then adviſed by the archbiſhop of Canterbury to fix her thoughts upon God, ſhe replied, that her thoughts did not in the leaſt wander from him. Her voice ſoon after left her; ſhe fell into a lethargic ſlumber, which continued ſome hours; and ſhe expired gently without a groan, in the 70th year of her age, and 45th of her reign. She was ſucceeded by James I. king of Scotland; ſince which time, the hiſtory of both England and Scotland is comprehended under the article BRITAIN.

245 Her death.

246 England, how divided.

Since the Norman conqueſt, England has been divided into ſix circuits, each circuit containing a certain number of counties. Two judges are appointed for each circuit, which they viſit in the ſpring and autumn, for adminiſtering juſtice to the ſubjects who are at a diſtance from the capital. In holding the Lent (or ſpring) aſſizes, the northern circuit extends only to York and Lancaſter; the aſſizes at Durham, Newcaſtle, Carliſle, and Appleby, being held only in the autumn, and diſtinguiſhed by the appellation of the *long circuit*. Theſe circuits and counties are:

1. *Home Circuit* contains the counties of Eſſex, Hertford, Kent, Surry, and Suſſex.
2. *Norfolk Circuit* contains thoſe of Bucks, Bedford, Huntingdon, Cambridge, Suffolk, and Norfolk.
3. *Oxford Circuit.* Oxon, Berks, Glouceſter, Worceſter, Monmouth, Hereford, Salop, and Stafford.
4. *Midland Circuit.* Warwick, Leiceſter, Derby, Nottingham, Lincoln, Rutland, and Northampton.
5. *Weſtern Circuit.* Hants, Wilts, Dorſet, Somerſet, Devon, and Cornwal.
6. *Northern Circuit.* York, Durham, Northumberland, Lancaſter, Weſtmoreland, and Cumberland.

Middleſex and Cheſhire are not comprehended in the above circuits; the former being the ſeat of the ſupreme courts of juſtice, and the latter a county palatine. There is ſtill a court of chancery in Lancaſter and Durham, with a chancellor; and there is a court of exchequer at Cheſter, of a mixed kind, both for law and equity, of which the chamberlain of Cheſter is judge: there are alſo other juſtices in the counties palatine to determine civil actions and pleas of the crown.

Beſides the 40 counties into which England is divided, there are counties corporate, conſiſting of certain diſtricts, to which the liberties and juriſdictions peculiar to a county have been granted by charter from the throne. Thus the city of London is a county diſtinct from Middleſex; the cities of York, Cheſter, Briſtol, Norwich, Worceſter, and the towns of Kingſton upon Hull and Newcaſtle upon Tyne, are counties of themſelves, diſtinct from thoſe in which they lie. The ſame may be ſaid of Berwick upon Tweed, which lies in Scotland, and has within its juriſdiction a ſmall territory of two miles on the north ſide of the river. Under the name of a *town*, boroughs and cities are contained: for every borough or city is a town, though every town is not a borough or city.—An account of the Engliſh conſtitution and government is given under the articles KING, LORDS, COMMONS, PARLIAMENT, LAW, LIBERTY, RIGHTS, &c.

247 Religion.

The eſtabliſhed religion of England is epiſcopacy. Since the reign of Henry VIII. the ſovereigns of England have been called, in public writs, the ſupreme heads of the church; but this title conveys no ſpiritual meaning, as it only denotes the regal power to prevent any eccleſiaſtical differences, or, in other words, to ſubſtitute the king in place of the pope before the reformation, with regard to temporalties and the internal œconomy of the church. The kings of England never intermeddle in eccleſiaſtical diſputes, and are contented to give a ſanction to the legal rights of the clergy.

The church of England, under this deſcription of the monarchical power over it, is governed by two archbiſhops, and 24 biſhops, beſides the biſhop of Sodor and Man, who, not being poſſeſſed of an Engliſh barony, does not ſit in the houſe of peers. See ARCHBISHOP and BISHOP.

England contains about 60 archdeacons. Subordinate to them are the rural deacons, formerly ſtyled *archpreſbyters*, who ſignify the biſhops pleaſure to his clergy, the lower claſs of which conſiſts of pariſh-prieſts (who are called *rectors* or *vicars*), deacons, and curates. See the articles CURATE, DEACON, PARSON, and VICAR.

The following is a liſt of the Engliſh biſhoprics, with

* See *Devereux*.

England, New England.

248 Revenues of the clergy.

with their revenues, as charged in the king's books: though that ſum is far from being the real annual value of the ſee, yet it aſſiſts in forming a comparative eſtimate between the revenues of each ſee with thoſe of another.

ARCHBISHOPRICS.	£.	s.	d.
Canterbury,	2682	12	2
York,	1610	0	0

BISHOPRICS.

London,	2000	0	0
Durham,	1821	1	3
Wincheſter,	3124	12	8

Theſe three biſhops take precedency of all others in England, and the others according to the ſeniority of their conſecrations.

Ely,	2134	18	6
Bath and Wells,	533	1	3
Hereford,	768	11	0
Rocheſter,	358	4	9
Lichfield and Coventry,	559	17	3
Cheſter,	420	1	8
Worceſter,	929	13	3
Chiceſter,	677	1	3
St Aſaph,	187	11	8
Saliſbury,	1385	5	0
Bangor,	131	16	3
Norwich,	834	11	7
Glouceſter,	315	7	3
Landaff,	154	14	2
Lincoln,	894	18	1
Briſtol,	294	11	0
Carliſle,	531	4	9
Exeter,	500	0	0
Peterborough,	414	14	8
Oxford,	381	11	0
St Davids,	426	2	1

The eccleſiaſtical government of England is, properly ſpeaking, lodged in the convocation; which is a national repreſentative or ſynod, and anſwers pretty near to the ideas we have of a parliament. They are convoked at the ſame time with every parliament; and their buſineſs is to conſider of the ſtate of the church, and to call thoſe to an account who have advanced new opinions, inconſiſtent with the doctrines of the church of England. Some high-flying clergymen during the reign of queen Anne, and in the beginning of that of George I. raiſed the powers of the convocation to a height that was inconſiſtent with the principles of religious toleration, and indeed of civil liberty: ſo that the crown was obliged to exert its prerogative of calling the members together, and of diſſolving them; and ever ſince they have not been permitted to ſit for any time, in which they could do buſineſs.

NEW ENGLAND, a province of the Britiſh empire in America, bounded on the north-eaſt by Nova Scotia, on the weſt by Canada, on the ſouth by New York, and on the eaſt by the Atlantic ocean. It lies between 41 and 49 degrees of north latitude, and between 67 and 74 of weſt longitude; extending in length 550 miles, and in breadth about 200.

1 firſt vered.

This country was diſcovered in the beginning of the laſt century, and called *North Virginia;* but no Europeans ſettled there till the year 1608. The firſt colony, which was weak and ill-directed, did not ſucceed; and, for ſome time, there were only a few adventurers who came over at times in the ſummer, built themſelves temporary huts for the ſake of trading with the ſavages, and, like them, diſappeared again for the reſt of the year. At laſt ſome Engliſh preſbyterians, who had been driven from their own country, and had taken refuge in Holland, reſolved to found a church for their ſect in the new hemiſphere. They therefore purchaſed, in 1521, the charter of the Engliſh North Virginia company. Forty-one families, making in all 120 perſons, landed in the beginning of a very hard winter, and found a country entirely covered with wood, which offered a very melancholy proſpect to men already exhauſted with the fatigues of their voyage. Near one half periſhed either by cold, the ſcurvy, or other diſtreſs. The courage of the reſt was beginning to fail; but it was revived by the arrival of 60 ſavage warriors, who came to them in the ſpring, headed by their chief. The old tenants aſſigned for ever to the new ones all the lands in the neighbourhood of the ſettlement they had formed, under the name of *New Plymouth;* and one of the ſavages who underſtood a little Engliſh, ſtaid to teach them how to cultivate the maize, and inſtruct them in the manner of fiſhing upon their coaſt.

New England.

This kindneſs enabled the colony to wait for the companions they expected from Europe, with ſeeds, with domeſtic animals, and with every aſſiſtance they wanted. At firſt theſe ſuccours arrived but ſlowly; but the perſecution of the puritans in England increaſed the number of proſelytes to ſuch a degree in America, that, in 1630, they were obliged to form different ſettlements, of which Boſton ſoon became the principal. Theſe firſt ſettlers were not merely eccleſiaſtics, who had been deprived of their preferments on account of their opinions; nor thoſe ſectaries influenced by new opinions, that are ſo frequent among the common people. There were among them ſeveral perſons of high rank, who, having embraced puritaniſm, had taken the precaution to ſecure themſelves an aſylum in theſe diſtant regions. They had cauſed houſes to be built, and lands to be cleared, with a view of retiring there, if their endeavours in the cauſe of civil and religious liberty ſhould prove abortive.

Raynal's Hiſtory of European Settlements.

The inhabitants of New England lived peaceably for a long time, without any regular form of policy. Their charter had indeed authorized them to eſtabliſh any mode of government they might chooſe; but theſe enthuſiaſts were not agreed among themſelves upon the plan of their republic, and government did not pay ſufficient attention to them to urge them to ſecure their own tranquillity. At length they grew ſenſible of the neceſſity of a regular legiſlation; and this great work, which virtue and genius united have never attempted but with diffidence, was boldly undertaken by blind fanaticiſm. It bore the ſtamp of the rude prejudices on which it had been formed. Three was in this new code a ſingular mixture of good and evil, of wiſdom and folly. No man was allowed to have a ſhare in the government except he were a member of the eſtabliſhed church. Witchcraft, perjury, blaſphemy, and adultery, were made capital offences; and children were alſo puniſhed with death, either for curſing or ſtriking their parents. Marriages, however, were to be ſolemnized by the magiſtrate. The price of corn was fixed at 2 s. 11½ d. per buſhel. The ſavages who ne-

2 Firſt code of laws.

glected to cultivate their lands were to be deprived of them; and Europeans were forbidden under a heavy penalty to ſell them any ſtrong liquors or warlike ſtores. All thoſe who were detected either in lying, drunkenneſs, or dancing, were ordered to be publicly whipped. But at the ſame time that amuſements were forbidden equally with vices and crimes, one might be allowed to ſwear by paying a penalty of 11¼ d. and to break the ſabbath for 2 l. 19 s. 9¾ d. Another indulgence allowed was, to atone, by a fine, for a neglect of prayer, or for uttering a raſh oath. But it is ſtill more extraordinary, that the worſhip of images was forbidden to the puritans on pain of death; which was alſo inflicted on Roman Catholic prieſts, who ſhould return to the colony after they had been baniſhed; and on Quakers who ſhould appear again after having been whipped, branded, and expelled. Such was the abhorrence for theſe ſectaries, who had themſelves an averſion for every kind of cruelty, that whoever either brought one of them into the country, or harboured him but for one hour, was liable to pay a conſiderable fine.

3
Quakers perſecuted.

Thoſe unfortunate members of the colony, who, leſs violent than their brethren, ventured to deny the coercive power of the magiſtrate in matters of religion, were perſecuted with ſtill greater rigour. This was conſidered as blaſphemy by thoſe very divines who had rather choſen to quit their country than to ſhew any deference to eſpiſcopal authority. This ſyſtem was ſupported by the ſeverities of the law, which attempted to put a ſtop to every difference in opinion, by inflicting capital puniſhment on all who diſſented. Thoſe who were either convicted, or even ſuſpected, of entertaining ſentiments of toleration, were expoſed to ſuch cruel oppreſſions, that they were forced to fly from their firſt aſylum, and ſeek refuge in another. They found one on the ſame continent; and as New England had been firſt founded by perſecution, its limits were extended by it.

This intemperate religious zeal extended itſelf to matters in themſelves of the greateſt indifference. A proof of this is found in the following public declaration, tranſcribed from the regiſters of the colony.

4
Law againſt wearing long hair.

"It is a circumſtance univerſally acknowledged, that the cuſtom of wearing long hair, after the manner of immoral perſons and of the ſavage Indians, can have been introduced into England only in ſacrilegious contempt of the expreſs command of God, who declares that it is a ſhameful practice for any man who has the leaſt care for his ſoul to wear long hair. As this abomination excites the indignation of all pious perſons; we, the magiſtrates, in our zeal for the purity of the faith, do expreſsly and authentically declare, that we condemn the impious cuſtom of letting the hair grow; a cuſtom which we look upon to be very indecent and diſhoneſt, which horribly diſguiſes men, and is offenſive to modeſt and ſober perſons, in as much as it corrupts good manners. We, therefore, being juſtly incenſed againſt this ſcandalous cuſtom, do deſire, adviſe, and earneſtly requeſt all the elders of our continent, zealouſly to ſhew their averſion for this odious practice, to exert all their power to put a ſtop to it, and eſpecially to take care that the members of their churches be not infected with it; in order that thoſe perſons, who, notwithſtanding theſe rigorous prohibitions, and the means of correction that ſhall be uſed on this account, ſhall ſtill perſiſt in this cuſtom, ſhall have both God and man at the ſame time againſt them."

This ſeverity ſoon exerted itſelf againſt the Quakers. They were whipped, baniſhed, and impriſoned. The behaviour of theſe new enthuſiaſts, who in the midſt of tortures and ignominy praiſed God, and called for bleſſings upon men, inſpired a reverence for their perſons and opinions, and gained them a number of proſelytes. This circumſtance exaſperated their perſecutors, and hurried them on to the moſt atrocious acts of violence; and they cauſed five of them, who had returned clandeſtinely from baniſhment, to be hanged. This ſpirit of perſecution was, however, at laſt ſuppreſſed by the interpoſition of the mother-country, from whence it had been brought. Charles II. moved with the ſufferings of the quakers, put a ſtop to them by a proclamation in 1661; but he was never able totally to extinguiſh the ſpirit of perſecution that prevailed in America.

The colony had placed at their head Henry Vane, the ſon of that Sir Henry Vane who had ſuch a remarkable ſhare in the diſturbances of his country. This obſtinate and enthuſiaſtic young man had contrived to revive the queſtions of grace and free-will. The diſputes upon theſe points ran very high; and would probably have plunged the colony into a civil war, if ſeveral of the ſavage nations united had not happened at that very time to fall upon the plantations of the diſputants, and to maſſacre great numbers of them. The coloniſts, heated with their theological conteſts, paid at firſt very little attention to this conſiderable loſs. But the danger at length became ſo urgent and ſo general, that all took up arms. As ſoon as the enemy was repulſed, the colony reſumed its former diſſentions; and the phrenzy which they excited, broke out in 1692 in a war, marked with as many atrocious inſtances of violence, as any ever recorded in hiſtory.

5
Extraordinary perſecution of witches.

There lived in a town of New England, called *Salem*, two young women who were ſubject to convulſions, accompanied with extraordinary ſymptoms. Their father, miniſter of the church, thought that they were bewitched; and having in conſequence caſt his ſuſpicions upon an Indian girl, who lived in this houſe, he compelled her by harſh treatment to confeſs that ſhe was a witch. Other women, upon hearing this, immediately believed, that the convulſions, which proceeded only from the nature of their ſex, were owing to the ſame cauſe. Three citizens, caſually named, were immediately thrown into priſon, accuſed of witchcraft, hanged, and their bodies left expoſed to wild beaſts and birds of prey. A few days after, 16 other perſons, together with a counſellor, who, becauſe he refuſed to plead againſt them, was ſuppoſed to ſhare in their guilt, ſuffered in the ſame manner. From this inſtant, the imagination of the multitude was inflamed with theſe horrid and gloomy ſcenes. Children of ten years of age were put to death, young girls were ſtripped naked, and the marks of witchcraft ſearched for upon their bodies with the moſt indecent curioſity; and thoſe ſpots of the ſcurvy which age impreſſes upon the bodies of old men, were taken for evident ſigns of the infernal power. In default of theſe, torments were employed to extort confeſſions dictated by the executioners themſelves. If the magiſtrates, tired out with executions, refuſed to puniſh, they were themſelves accuſed of the crimes they tolerated ; the very miniſters of religion raiſed falſe witneſſes againſt them, who made them forfeit with their lives the tardy remorſe excited in them by humanity. Dreams, apparitions, terror, and conſternation of every kind, increaſed theſe prodigies of folly and horror. The priſons were filled, the gibbets left ſtanding, and all the citizens involved in gloomy apprehenſions. The moſt prudent quitted the country ſtained with the blood of its inhabitants ; and nothing leſs than the total and immediate ſubverſion of the colony was expected, when, on a ſudden, all eyes were opened at once, and the exceſs of the evil awakened the minds which it had firſt ſtupefied. Bitter and painful remorſe was the immediate conſequence ; the mercy of God was implored by a general faſt, and public prayers were offered up to aſk forgiveneſs for the preſumption of having ſuppoſed that heaven could have been pleaſed with ſacrifices with which it could only have been offended.

Poſterity, will, probably, never know exactly what was the cauſe or remedy of this dreadful diſorder. It had, perhaps, its firſt origin in the melancholy which thoſe perſecuted enthuſiaſts had brought with them from their own country, which had increaſed with the ſcurvy they had contracted at ſea, and had gathered freſh ſtrength from the inconveniencies and hardſhips inſeparable from a change of climate and manner of living. The contagion, however, ceaſed like all other epidemical diſtempers, exhauſted by its very communication. A perfect calm ſucceeded this agitation ; and the Puritans of New England have never ſince been ſeized with ſo gloomy a fit of enthuſiaſm.

But though the colony has renounced the perſecuting ſpirit which hath ſtained all religious ſects with blood, it has preſerved ſome remains if not of intoleration, at leaſt of ſeverity, which reminds us of thoſe melancholy days in which it took its riſe. Some of its laws are ſtill too ſevere.

New England had, however, ſome remedy, againſt bad laws, in the conſtitution of its mother-country, where the people who have the legiſlative power in their own hands are at liberty to correct abuſes ; and it has others derived from its ſituation, which open a vaſt field to induſtry and population.

6
Manner of ſettlement in this colony.

The clearing of the lands in this colony is not directed by chance as in the other provinces. This matter from the firſt was ſubjected to laws which are ſtill religiouſly obſerved. No citizen whatever has the liberty of ſettling even upon unoccupied land. The government, deſirous of preſerving all its members from the inroads of the ſavages, and of placing them in a condition to ſhare in the protection of a well-regulated ſociety, hath ordered that whole villages ſhould be formed at once. As ſoon as 60 families offer to build a church, maintain a clergyman, and pay a ſchoolmaſter, the general aſſembly allot them a ſituation, and permit them to have two repreſentatives in the legiſlative body of the colony. The diſtrict aſſigned them always borders upon the lands already cleared, and generally contains 60,000 ſquare acres. Theſe new people chooſe the ſituation moſt convenient for their habitation, which is uſually of a ſquare figure. The church is placed in the centre ; the coloniſts divide the land among themſelves, and each incloſes his property with a hedge. Some woods are reſerved for a common ; and thus New England is conſtantly enlarging its territory, though it ſtill continues to make one complete and well conſtituted province.

7
Climate, &c.

Though the colony is ſituated in the midſt of the temperate zone, yet the climate is not ſo mild as that of ſome European provinces which are under the ſame parallel. The winters are longer and colder ; the ſummers ſhorter and hotter. The ſky is commonly clear, and the rains are more plentiful than laſting. The air is grown purer ſince its circulation has been made free by cutting down the woods ; and malignant vapours, which at firſt carried off numbers of the inhabitants, are no longer complained of.

8
Diviſion, &c.

The country is divided into four provinces, which at firſt had no connection with one another. The neceſſity of maintaining an armed force againſt the ſavages, obliged them to form a confederacy in 1643, when they took the name of the *United Colonies*. In conſequence of this league, two deputies from each eſtabliſhment uſed to meet in a ſtated place to deliberate upon the common affairs of New England, according to the inſtructions they had received from the aſſembly by which they were ſent. This aſſociation laid no conſtraint upon the right of every individual to act entirely as he pleaſed, without either the permiſſion or approbation of the mother-country. All the ſubmiſſion required of theſe provinces was merely to acknowledge the kings of England for their ſovereigns. Charles II. wiſhed to make them more dependent. The province of Maſſachuſet's bay, which, though the ſmalleſt, was the richeſt and the moſt populous of the four, being guilty of ſome miſdemeanour againſt government, the king ſeized that opportunity of taking away its charter in 1684 : and it remained without one till the revolution ; when it received another, which, however, did not anſwer its claims or expectations. The crown reſerved to itſelf the right of nominating the governor, and appointing to all military employments, and to all principal poſts in the civil and juridical departments : it allowed the people of the colony their legiſlative power, and gave the governor a negative voice and the command of the troops, which ſecured him a ſufficient influence to enable him to maintain the prerogative of the mother-country in all its force. The provinces of Connecticut and Rhode-Iſland by timely ſubmiſſion prevented the puniſhment which that of Maſſachuſet had incurred, and retained their original charter. That of New-Hampſhire had been always regulated by the ſame mode of adminiſtration as the province of Maſſachuſet's bay. The ſame governor preſides over the whole colony, but with regulations adapted to the conſtitution of each province. According to the moſt exact calculations, the number of inhabitants in New England, before the commencement of the preſent war, was computed at 400,000 ; but the ſouthern parts of the colony are better peopled than the northern, where the ſoil is leſs fertile. Among ſuch a number of citizens, there are few proprietors wealthy enough to leave the care of their plantations to ſtewards or farmers : moſt of them are planters in eaſy circumſtances, who live upon their eſtates, and are employed in the labours of the field. This equality of fortune, joined to their religious principles, and to the nature of the government, gives this people a more republican caſt than is to be obſerved in the other colonies.

No European fruits have degenerated in New England; it is even ſaid, that the apple is improved, at leaſt has multiplied exceedingly, and made cyder a more common drink there than in any other part of the world. All European roots and garden-ſtuffs have equally proſpered; but the ſeeds have not thriven quite ſo well. Wheat is apt to be blighted, barley grows dry, and oats yield more ſtraw than grain. In default of theſe, the maize, which is commonly uſed in making beer, is the drink of the common people. There are large and fruitful meadows, which are covered with numerous flocks.

The arts, though carried to a greater degree of perfection in this colony than in any of the others, have not made near the ſame progreſs as agriculture. Before the commencement of the diſputes with the mother-country, there were not more than four or five manufactures of any importance.

ENGLISH, or the English *Tongue*, the language ſpoken by the people of England, and, with ſome variation, by thoſe of Scotland, as well as part of Ireland, and the reſt of the Britiſh dominions.

The ancient language of Britain is generally allowed to have been the ſame with the Gaulic, or French; this iſland, in all probability, having been firſt peopled from Gallia, as both Ceſar and Tacitus affirm, and prove by many ſtrong and concluſive arguments, as by their religion, manners, cuſtoms, and the nearneſs of their ſituation. But now we have very ſmall remains of the ancient Britiſh tongue, except in Wales, Cornwall, the iſlands and Highlands of Scotland, part of Ireland, and ſome provinces of France; which will not appear ſtrange, when what follows is conſidered.

Julius Ceſar, ſome time before the birth of our Saviour, made a deſcent upon Britain, though he may be ſaid rather to have diſcovered than conquered it; but, about the year of Chriſt 45, in the time of Claudius, Aulus Plautius was ſent over with ſome Roman forces, by whom two kings of the Britons, Togodumnus and Caractacus, were both overcome in battle: whereupon a Roman colony was planted at Malden in Eſſex, and the ſouthern parts of the iſland were reduced to the form of a Roman province: after that, the iſland was conquered as far north as the friths of Dunbarton and Edinburgh, by Agricola, in the time of Domitian; whereupon a great number of the Britons, in the conquered part of the iſland, retired to the weſt part called *Wales*, carrying their language with them.

The greateſt part of Britain being thus become a Roman province, the Roman legions, who reſided in Britain for above 200 years, undoubtedly diſſeminated the Latin tongue; and the people being afterwards governed by laws written in Latin, muſt neceſſarily make a mixture of languages. This ſeems to have been the firſt mutation the language of Britain ſuffered.

Thus the Britiſh tongue continued, for ſome time, mixed with the provincial Latin, till, the Roman legions being called home, the Scots and Picts took the opportunity to attack and harraſs England: upon which, K. Vortigern, about the year 440, called the Saxons to his aſſiſtance; who came over with ſeveral of their neighbours, and having repulſed the Scots and Picts, were rewarded for their ſervices with the iſle of Thanet, and the whole county of Kent; but growing too powerful, and not being contented with their allotment, diſpoſſeſſed the inhabitants of all the country on this ſide of the Severn †: thus the Britiſh tongue was in a great meaſure deſtroyed, and the Saxon introduced in its ſtead.

What the Saxon tongue was long before the conqueſt, about the year 700, we may obſerve in the moſt ancient manuſcript of that language, which is a gloſs on the Evangeliſts, by biſhop Edfrid, in which the three firſt articles of the Lord's prayer runs thus:

“ Uren fader thic arth in heofnas, ſic gehalgud thin noma, ſo cymeth thin ric. Sic thin willa ſue is heofnas, and in eortho, &c.”

In the beginning of the ninth century the Danes invaded England; and, getting a footing in the northern and eaſtern parts of the country, their power gradually increaſed, and they became ſole maſters of it in about 200 years. By this means the ancient Britiſh obtained a tincture of the Daniſh language; but their government being of no long continuance, did not make ſo great an alteration in the Anglo-Saxon, as the next revolution, when the whole land, A. D. 1067, was ſubdued by William the conqueror, duke of Normandy in France: for the Normans, as a monument of their conqueſt, endeavoured to make their language as generally received as their commands, and thereby rendered the Britiſh language an entire medley.

About the year 900, the Lord's prayer, in the ancient Anglo-Saxon, ran thus:

“ Thue ur fader the eart on heofenum, ſi thin nama gehalgod; cume thin rice ſi thin willa on eórthan ſwa, ſwo on heofenum, &c.”

About the year 1160, under Henry II. it was rendered thus by pope Adrian, an Engliſhman, in rhyme:

“ Ure fader in heaven rich,
“ Thy name be halyed ever lich,
“ Thou bring us thy michell bliſſe:
“ Als hit in heaven y doe,
“ Evar in yearth beene it alſo, &c.”

Dr Hicks gives us an extraordinary ſpecimen of the Engliſh, as ſpoken in the year 1385, upon the very ſubject of the Engliſh tongue.

“ As it is knowe how meny maner peple beeth in this lond; ther beeth alſo ſo many dyvers longages and tonges. Notheleſs Walſchemen and Scots that beeth nought medled with other nation, holdeth wel nyh hir firſte longage and ſpeche; but yif the Scottes, that were ſometime confederate and woned with the Pictes, drawe ſomewhat after hir ſpeche; but the Flemynges, that woneth on the weſt ſide of Wales, haveth loſt her ſtrange ſpech, and ſpeketh Sexonliche now. Alſo Engliſhemen, they had from the bygynnynge thre maner ſpeche; northerne, ſoutherne, and middel ſpeche in the middel of the lond, as they come of thre maner of peple of Germania: notheleſs by commyxtion and mellynge firſt with Danes, and afterwards with Normans, in meny the contrary longage is apayred (*corrupted*.)

“ This apayrynge of the burth of the tunge is bycauſe of tweie things; oon is for children in ſcole agenſt the uſuage and maner of all other nations, beeth compelled for to leve hire own longage, and for to conſtrue hir leſſons and here thynges in French, and ſo they haveth ſethe Normans come firſt into Engelond. Alſo gentlemen children beeth taught to ſpeke Frenſche from

† See *England*, n° 13, —41.

from the tyme that they beeth roked in here cradel, and kunneth ſpeke and play with a childe's broche; and uplondiſſche men will lykne hymſelf to gentilmen, and fondeth with great beſyneſſe for to ſpeak Frenſche to be told of.—Hit ſeemeth a greet wonder how Engliſchemen and her own longage and tonge is ſo dyverſe of ſown in this oon iland: and the longage of Normandie is comlynge of another lond, and hath oon maner ſoun amonge alle men that ſpeketh hit arigt in Engelond. Alſo of the foreſaid Saxon tonge that is deled (*divided*) a three, and is abide ſcarceliche with fewe uplondiſſche men, is greet wonder. For men of the eſt, with men of the weſt, is, as it were, undir the ſame partie of hevene accordeth more in ſownynge of ſpeche, than men of the north with men of the ſouth. Therefore it is that Mercii, that beeth men of myddel Engelond, as it were, parteners of the endes, underſtondeth bettre the ſide longes northerne and ſoutherne, than northerne and ſoutherne underſtondeth either other.—All the longage of the Northumbers and ſpechialliche at York, is ſo ſcharp, ſlitting and frotynge, and unſchape, that we ſoutherne men may that longage unnethe underſtonde, &c."

In the year 1537, the Lord's prayer was printed as follows: "O oure father which arte in heven, hallowed be thy name: let thy kingdome come, thy will be fulfilled as well in erth as it is in heven; geve us this daye in dayly bred, &c." Where it may be obſerved, that the diction is brought almoſt to the preſent ſtandard, the chief variations being only in the orthography. By theſe inſtances, and many others that might be given, it appears, that the Engliſh Saxon language, of which the Normans deſpoiled us in a great meaſure, had its beauties, was ſignificant and emphatical, and preferable to what they impoſed on us. "Great, verily, (ſays Camden), was the glory of our tongue before the Norman conqueſt, in this, that the old Engliſh could expreſs moſt aptly, all the conceptions of the mind in their own tongue, without borrowing from any." Of this he gives ſeveral examples.

Having thus ſhewn how the ancient Britiſh language was in a manner extirpated by the Romans, Danes, and Saxons, and ſucceeded by the Saxon, and after that the Saxon blended with the Norman French, we ſhall now mention two other cauſes of change in the language. The firſt of theſe is owing to the Britons having been a long time a trading nation, whereby offices, dignities, names of wares, and terms of traffic, are introduced, which we take with the wares from the perſons of whom we have them, and form them anew, according to the genius of our own tongue; and beſides this change in the language, ariſing from commerce, Britain's having been a conſiderable time ſubject to the ſee of Rome, in eccleſiaſtical affairs, muſt unavoidably have introduced ſome Italian words among us. Secondly, As to the particular properties of a language, our tongue has undergone no ſmall mutation, or rather has received no ſmall improvement upon that account: for, as to the Greek and Latin, the learned have, together with the arts and ſciences now rendered familiar among us, introduced abundance; nay, almoſt all the terms of art in the mathematics, philoſophy, phyſic, and anatomy; and we have entertained many more from the Latin, French, &c. for the ſake of neatneſs and elegancy: ſo that, at this day, our language, which, about 1800 years ago, was the ancient Britiſh, or Welſh, &c. is now a mixture of Saxon, Teutonic, Dutch, Daniſh, Norman, and modern French, embelliſhed with the Greek and Latin. Yet this, in our opinion, is ſo far from being a diſadvantage to the Engliſh tongue as now ſpoken, (for all languages have undergone changes, and do continually participate with each other), that it has ſo enriched it, as now to become the moſt copious, ſignificant, fluent, courteous, and maſculine language in Europe, if not in the world*.

ENGRAFTING, in gardening. See GRAFTING.

ENGRAILED, or INGRAILED, in heraldry, a term derived from the French *greſly*, "hail;" and ſignifying a thing the hail has fallen upon and broke off the edges, leaving them ragged, or with half-rounds, or ſemicircles, ſtruck out of their edges.

ENGRAVING, the art of cutting metals and precious ſtones, and repreſenting thereon figures, letters, or whatever device, or deſign, the artiſt fancies.

Engraving, properly a branch of ſculpture, is divided into ſeveral other branches, according to the matter whereon it is employed, and the manner of performing it. For the rudeſt branch, that of

ENGRAVING *on Wood*. See CUTTING *in Wood*.

ENGRAVING *on Copper*, the making, correſpondently to ſome delineated figure or deſign, ſuch concave lines on a ſmooth ſurface of copper, either by cutting or corroſion, as render it capable, when charged properly with any coloured fluid, of imparting by compreſſion an exact repreſentation of the figure or deſign to paper or parchment.

Whether we conſider the art of engraving, with regard to the utility and pleaſure it affords, or the difficulty that attends its execution, we cannot but confeſs, that on every account it deſerves a diſtinguiſhed rank among the polite arts †. It is by means of this art that the cabinets of the curious are adorned with the portraits of the greateſt men of all ages and all nations; that their memories, their moſt remarkable and moſt glorious actions, are tranſmitted to the lateſt poſterity. It is by this art alſo, that the paintings of the greateſt maſters are multiplied to a boundleſs number; and that the lovers of the polite arts, diffuſed over the face of the whole earth, are enabled to enjoy thoſe beauties which their diſtant ſituations ſeemed to have for ever debarred them; and perſons of moderate fortunes are hereby enabled to become poſſeſſed of all the ſpirit, and all the poetry, that are contained in thoſe miracles of art, which ſeemed to have been reſerved for the temples of Italy, or the cabinets of princes. When we reflect, moreover, that the engraver, beſide the beauties of poetic compoſition, and the artful ordinance of deſign, is to expreſs, merely by the means of light and ſhade, all the various tints of colours and clair obſcure; to give a relief to each figure, and a truth to each object; that he is now to paint a ſky ſerene and bright, and then loaded with dark clouds; now the pure tranquil ſtream, and then the foaming, raging ſea; that here he is to expreſs the character of the man, ſtrongly marked in his countenance, and there the minuteſt ornament of his dreſs; in a word, that he is to repreſent all, even the moſt difficult objects in nature; we cannot ſufficiently admire the vaſt improvements in this art, and that degree of perfection to which it is at this day arrived. See the article PRINTS.

* See *Language*.

† See *Polite* ARTS, n° 13.

Bielfield's Elem. of Erudition.

The invention of this art is ſaid to be owing to chance. In the 15th century, a goldſmith of Florence, who was in much eſteem with pope Innocent X. having placed a ſheet of oiled paper under a plate of ſilver that was engraved, and on which, by accident, he had laid a heavy weight, was much ſurpriſed to find, a few days after, a complete impreſſion of the plate upon the paper. This he communicated to ſome able painters, his cotemporaries; who profiting by that example, laid the firſt foundation of the art of engraving: which Raphael in Italy, and Albert Durer in Germany, greatly improved; and which the Italian, French, and Flemiſh maſters, ſuch as Michael Angelo, Edelinck, Rembrandt, &c. and lately ſome of the Britiſh artiſts, have ſucceſſively carried to the higheſt degree of excellence.

The method by which engraving is performed, is of three kinds: By the graver or tool alone, which is in common language the only kind called *engraving:* by corroſion with aqua fortis, which is generally called *etching:* and by covering the ſurface of a copper-plate with a freeze or ground, in ſuch a manner, that the whole would produce the effect of black in an impreſſion; and then ſcraping or burniſhing away part of the freeze, ſo as to cauſe the remainder to have the ſame effect as if they had been cut on the even ſurface, according to the delineation of any figure or deſign; which laſt kind is called *ſcraping in mezzotinto.* See ETCHING and MEZZOTINTO.

Engraving with the tool was the kind originally practiſed, and it is yet retained for many purpoſes. For though the manœuvre of etching be more eaſy, and other advantages attend it; yet where great regularity and exactneſs of the ſtroke or lines are required, the working with the graver is much more effectual: on which account it is more ſuitable to the preciſion neceſſary in the execution of portraits; as there every thing the moſt minute muſt be made out and expreſſed, according to the original ſubject, without any licenſe to the fancy of the deſigner in deviating from it, or varying the effect either by that maſterly negligence and ſimplicity in ſome parts, or thoſe bold ſallies of the imagination and hand in others, which give ſpirit and force to hiſtory-painting.

The principal inſtruments uſed in engraving with the tool, are gravers, ſcrapers, a burniſher, an oil-ſtone, and a cuſhion for bearing the plates.

Gravers are made in ſeveral forms with reſpect to the points, ſome being ſquare, others lozenge; the ſquare graver for cutting broad and deep, and the lozenge for more delicate and fine ſtrokes and hatches. La Boſſe recommends, as the moſt generally uſeful, ſuch as are of a form betwixt the ſquare and lozenge: and he adviſes, that they ſhould be of a good length; ſmall towards the point, but ſtronger upwards, that they may have ſtrength enough to bear any ſtreſs there may be occaſion to lay upon them: for if they be too ſmall and mounted high, they will bend; which frequently cauſes their breaking, eſpecially if they be not employed for very ſmall ſubjects.

The burniſher is uſed to aſſiſt in the engraving on ſome occaſions, as well as to poliſh the plates. It is ſeven inches in length, and made of fine ſteel well poliſhed. The burniſher is formed at one end, and a ſcraper on the other, each about an inch and a half long from the point: betwixt them, about four inches of the inſtrument is made round, and ſerves as a handle; and is thicker in the middle than at the necks, where the burniſher and ſcraper begin, which necks are only one quarter of an inch in diameter. The principal application of it in engraving, beſides its uſe in poliſhing the plates, is to take out any ſcratches, or accidental defacings, that may happen to the plates during the engraving; or to leſſen the effect of any parts that may be too ſtrongly marked in the work, and require to be taken down.

A cuſhion, as it is called, is likewiſe generally uſed for ſupporting the plate in ſuch a manner, that it may be turned every way with eaſe. It is a bag of leather filled with ſand, which ſhould be of the ſize that will beſt ſuit the plates it is intended to bear. They are round, and about nine inches over, and three inches in thickneſs.

The cuſhion, made as above directed, being laid on the table, the plate muſt be put upon it; and the graver being held in the hand, according to the inſtructions before given, the point muſt be applied to the plate, and moved in the proper direction for producing the figures of the lines intended: obſerving, in forming ſtraight lines, to hold the plate ſteady on the cuſhion; and where they are to be finer, to preſs more lightly, uſing greater force where they are to be broader and deeper. In making circular or other curve lines, hold your hand and graver ſteadily; and as you work, turn your plate upon the cuſhion againſt your graver, otherwiſe it will be impoſſible for you to make any circular or curved lines with that neatneſs and command of hand you by this means may. After part of the work is engraved, it is neceſſary to ſcrape it with the ſcraper, or graver, paſſed in the moſt level direction over the plate to take off the roughneſs formed by the cutting of the graver; but great care muſt be taken not to incline the edge of the ſcraper or tool uſed, in ſuch a manner that it may take the leaſt hold of the copper, as it would otherwiſe produce falſe ſtrokes or ſcratches in the engraving: and that the engraved work may be rendered more viſible, it may afterwards be rubbed over with a roll of felt dipped in oil. In uſing the graver, it is neceſſary to carry it as level as poſſible with the ſurface of the plate; for otherwiſe, if the fingers ſlip betwixt them, the line that will be produced, whether curve or ſtraight, will become deeper and deeper in the progreſs of its formation; which entirely prevents ſtrokes being made at one cut, that will be fine at their extremities, and larger in the middle; and occaſions the neceſſity of retouching, to bring them to that ſtate. For this reaſon, it is very neceſſary for thoſe, who would learn to engrave in perfection, to endeavour, by frequent trials, to acquire the habit of making ſuch ſtrokes both ſtraight and curving, by lightening or ſinking the graver with the hand, according to the occaſion. If, after finiſhing the deſign, any ſcratches appear, or any part of the engraving be falſely executed, ſuch ſcratches, or faulty parts, muſt be taken out by the burniſher, and further poliſhed, if neceſſary, by the above-mentioned roll.

The plate being thus engraved, it is proper to round off the edges, by uſing firſt a rough file, and afterwards a ſmoother; and to blunt the corners a little, by the ſame means: after which, the burniſher ſhould be paſſed over the edges to give it a farther poliſh.

Engraving *on Precious Sones*, is the repreſenting of figures, or devices, in relievo or indented, on divers kinds of hard poliſhed ſtones.

The art of engraving on precious ſtones is one of thoſe wherein the ancients excelled; there being divers antique agates, cornelians, and onyxes, which ſurpaſs any thing of that kind the moderns have produced. Pyrgoteles among the Greeks, and Dioſcorides under the firſt emperors of Rome, are the moſt eminent engravers we read of: the former was ſo eſteemed by Alexander, that he forbad any body elſe to engrave his head; and Auguſtus's head, engraven by the latter, was deemed ſo beautiful, that the ſucceeding emperors choſe it for their ſeal.

All the polite arts having been buried under the ruins of the Roman empire, the art of engraving on ſtones met with the ſame fate. It was retrieved in Italy at the beginning of the 15th century, when one John of Florence, and after him Dominic of Milan, performed works of this kind no way to be deſpiſed. From that time, ſuch ſculptures became common enough in Europe, and particularly in Germany, whence great numbers were ſent into other countries: but they came ſhort of the beauty of thoſe of the ancients, eſpecially thoſe on precious ſtones; for, as to thoſe on cryſtal, the Germans, and, after their example, the French, &c. have ſucceeded well enough.

In this branch of engraving, they make uſe either of the diamond, or of emery.

The diamond, which is the hardeſt of all ſtones, is only cut by itſelf, or with its own matter. The firſt thing to be done in this branch of engraving, is to cement two rough diamonds to the ends of two ſticks big enough to hold them ſteady in the hand, and to rub or grind them againſt each other till they be brought to the form deſired. The duſt or powder that is rubbed off ſerves afterwards to poliſh them, which is performed with a kind of mill that turns a wheel of ſoft iron. The diamond is fixed in a braſs diſh; and, thus applied to the wheel, is covered with diamond-duſt, mixed up with oil of olives; and when the diamond is to be cut facet-wiſe, they apply firſt one face, then another, to the wheel. Rubies, ſapphires, and topazes, are cut and formed the ſame way on a copper wheel, and poliſhed with tripoli diluted in water. As to agates, amethyſts, emeralds, hyacinths, granates, rubies, and others of the ſofter ſtones, they are cut on a leaden wheel, moiſtened with emery and water, and poliſhed with tripoli on a pewter wheel. Lapis-lazuli, opal, &c. are poliſhed on a wooden wheel. To faſhion and engrave vaſes of agate, cryſtal, lapis-lazuli, or the like, they make uſe of a kind of lathe, like that uſed by pewterers to hold the veſſels, which are to be wrought with proper tools: that of the engraver generally holds the tools, which are turned by a wheel; and the veſſel is held to them to be cut and engraved, either in relievo or otherwiſe; the tools being moiſtened from time to time with diamond duſt and oil, or at leaſt emery and water. To engrave figures or devices on any of theſe ſtones, when poliſhed, ſuch as medals, ſeals, &c. they uſe a little iron wheel, the ends of whoſe axis are received within two pieces of iron, placed upright, as in the turner's lathe; and to be brought cloſer, or ſet further apart, at pleaſure: at one end of the axis are fitted the proper tools, being kept tight by a ſcrew. Laſtly, The wheel is turned by the foot, and the ſtone applied by the hand to the tool, and is ſhifted and conducted as occaſion requires.

The tools are generally of iron, and ſometimes of braſs; their form is various, but it generally bears ſome reſemblance to chiſels, gouges, &c. Some have ſmall round heads, like buttons, others like ferrels, to take the pieces out, and others flat, &c. When the ſtone has been engraven, it is poliſhed on wheels of hair-bruſhes and tripoli.

Engraving *on Steel* is chiefly employed in cutting ſeals, punches, matrices, and dyes proper for ſtriking coins, medals, and counters. The method of engraving with the inſtruments, &c. is the ſame for coins as for medals and counters: All the difference conſiſts in their greater or leſs relievo; the relievo of coins being much leſs conſiderable than that of medals, and that of counters ſtill leſs than that of coins.

Engravers in ſteel commonly begin with punches, which are in relievo, and ſerve for making the creux, or cavities, of the matrices and dyes: though ſometimes they begin with the creux, or hollowneſs; but then it is only when the intended work is to be cut very ſhallow. The firſt thing done, is that of deſigning the figures; the next is the moulding them in wax, of the ſize and depth they are to lie, and from this wax the punch is engraven. When the punch is finiſhed, they give it a very high temper, that it may the better bear the blows of the hammer with which it is ſtruck to give the impreſſion to the matrix.

The ſteel is made hot to ſoften it, that it may the more readily take the impreſſion of the punch; and after ſtriking the punch on it, in this ſtate, they proceed to touch up or finiſh the ſtrokes and lines, where by reaſon of their fineneſs or the too great relievo they are any thing defective, with ſteel gravers of different kinds, chiſels, flatters, &c. being the principal inſtruments uſed in graving on ſteel.

The figure being thus finiſhed, they proceed to engrave the reſt of the medal, as the mouldings of the border, the engrailed ring, letters, &c. with little ſteel punches, well tempered, and very ſharp.

ENGUICHE', in heraldry, is ſaid of the great mouth of a hunting horn, when its rim is of a different colour from that of the horn itſelf.

ENHARMONIC, in muſic. The Greeks had three different ſpecies of muſic; the *diatonic*, the *chromatic*, and the *enharmonic*. This laſt was eſteemed by much the moſt agreeable and powerful of the three; but the difficulty of its execution rendered its duration ſhort, and latter artiſts were upbraided for having ſacrificed it to their indolence. It proceeded upon leſſer intervals than either the diatonic or chromatic; and as the chromatic ſemitone is ſtill leſs than the diatonic, the *enharmonic* intervals muſt have conſiſted of that ſemitone divided into parts more minute. In Rouſſeau's Muſical Dictionary (at the word *Enharmonique*), the reader may ſee how that interval was found in the tetrachords of the ancients. It is by no means eaſy for modern ears, inured to intervals ſo widely different, to imagine how a piece of muſic, whoſe tranſitions were formed either chiefly or ſolely upon ſuch minute diviſions, could have ſuch wonderful effects; yet the melody of ſpeech, which riſes or falls by intervals ſtill more minute than the enharmonic, when properly modulated, and applied with taſte, has an aſtoniſhing power over the ſoul. As to the modern *enharmonic* ſyſtem, we may likewiſe refer the reader to the ſame work for an account of its nature and uſe; though he will find it accurately and clearly explained by D'Alembert, in the Treatiſe of Music given in the preſent work, (art. 144. 145. 146.)

ENHYDRUS, in natural hiſtory, a genus of ſiderochita or cruſtated ferrugineous bodies, formed in large and in great part empty caſes, incloſing a ſmall quantity of an aqeous fluid.

Of this genus there are only two ſpecies: 1. The thick-ſhelled enhydrus, with black, reddiſh-brown, and yellow cruſts. 2. The thinner-ſhelled kind, with yellowiſh-brown and purple cruſts; neither of which ferments with aqua fortis, or gives fire with ſteel.

ENIGMA. See Ænigma.

ENIXUM, among chemiſts, a kind of neutral ſalt, generated of an acid and an alkali.

The ſal enixum of Paracelſus, is the caput mortuum of ſpirits of nitre with oil of vitriol, or what remains in the retort after the diſtillation of this ſpirit; being of a white colour, and pleaſing acid taſte.

ENMANCHE', in heraldry, is when lines are drawn from the centre of the upper edge of the chief to the ſides, to about half the breadth of the chief; ſignifying ſleeved, or reſembling a ſleeve, from the French *manche*.

ENNEAGON, in geometry, a polygon with nine ſides. See Polygon.

ENNEAHEDRIA, in natural hiſtory, a genus of columnar, cryſtalliform, and double-pointed ſpars, compoſed of a trigonal column, terminated at each end by a trigonal pyramid.

Of this genus there are ſeveral ſpecies, diſtinguiſhed by the length or ſhortneſs of the column and pyramids, none of which give fire with ſteel, but all of them ferment with aqua fortis. See Spar.

ENNEANDRIA, in botany, (from εννεα, nine, and ανηρ, a man or huſband), the name of the ninth claſs in Linnæus's ſexual ſyſtem, conſiſting of plants which have hermaphrodite flowers with nine ſtamina or male organs. See Botany, p. 1292.

ENNIUS (Quintus), an ancient Latin poet, born at Rudii, a town in Calabria. He came firſt to Rome when M. Porcius Cato was queſtor, whom he had inſtructed in the Greek language in Sardinia; and by his genius and behaviour he gained the eſteem of the moſt eminent perſons in the city. According to Horace, Ennius never applied himſelf to writing till he had drank freely of wine. Hence he contracted the gout, of which he died 9 y. B. C. He was interred in Scipio's ſepulchre; who had a great eſteem and friendſhip for him, and cauſed a ſtatue to be erected to him upon his monument. He endeavoured to introduce the treaſures of the Greek tongue among the Latins, and was the firſt among the Romans who made uſe of heroic verſes. He wrote the *Annals of Rome*: he tranſlated ſeveral tragedies from the Greek, and wrote others, beſide ſeveral comedies. We have only ſome fragments of his works, which were firſt collected by the two Stephens, and afterwards publiſhed at Naples, with a learned commentary, by Jerom Columna, in quarto, 1590; and reprinted at Amſterdam in 1707, in quarto, with additions by Heſſelius.

ENOCH (the Prophecy of); an apocryphal book, of which there remains but a few fragments.

Enoch was certainly one of the moſt illuſtrious prophets of the firſt world, ſince Moſes ſays of him, that *he walked with God*. This prophet is famed in the church for two things: The firſt is, his being taken up into heaven, without ſeeing death, (Heb. xi. 5.): the ſecond is, his prophecy; a paſſage of which St Jude has cited in his epiſtle, ver. 14. The ancients greatly eſteemed the prophecy of Enoch. Tertullian, on the authority of this book, deduces the original of idolatry, aſtrology, and unlawful arts, from the revolted angels, who married with the daughters of men. And it is on the teſtimony of this book, that the fathers of the 2d and 3d centuries, as Irenæus, Cyprian, and Lactantius, received for true this fable of the marriage of the angels with the daughters of men. St Auguſtin, who was leſs credulous, allows, indeed, that Enoch wrote ſomething divine, becauſe he is cited by St Jude; but inſinuates, that the authority of this book is doubtful, and that it cannot be proved that it was really written by Enoch. Indeed, the account it gives of giants engendered by angels, and not by men, has manifeſtly the air of a fable; and the moſt judicious critics believe, it ought not to be aſcribed to Enoch.

ENS, among metaphyſicians, denotes entity, being, or exiſtence: this the ſchools call *ens reale*, and *ens poſitivum*; to diſtinguiſh it from their *ens rationis*, which is only an imaginary thing, or exiſts only in the imagination.

Ens, among chemiſts, imports the power, virtue, and efficacy, which certain ſubſtances exert upon our bodies.

Ens, in geography, a city of Germany, ſituated at the confluence of the Danube and the river Ens, about 80 miles ſouth of Vienna: E. Long. 14. 20. N. Lat. 48. 16.

ENSATÆ, in botany, (from *enſis*, a ſword); the name of the ſixth order in Linnæus's natural method, conſiſting of plants with ſword-ſhaped leaves*. It contains the following genera, *viz.* Antholyza, Calliſia, Commelina, Crocus, Eriocaulon, Ferraria, Gladiolus, Iris, Ixia, Moræa, Pontæderia, Siſyrinchium, Tradeſcantia, Wachendorffa, Xyris.

ENSEELED, in falconry, is ſaid of a hawk that has a thread drawn through her upper eye-lid, and made faſt under her beak, to take away the ſight.

ENSEMBLE, a French term, ſometimes uſed in our language; literally ſignifying *together*, or *one with another*:—being formed from the Latin *in* and *ſimul*.

In architecture, we ſay *the enſemble*, or *tout enſemble*, of a building, meaning the whole work, or compoſition, conſidered together, and not in parts; and ſometimes alſo, the relative proportion of the parts to the whole.—"All thoſe pieces of building make a fine *enſemble*."

To judge well of a work, a ſtatue, or other piece of ſculpture, one muſt firſt examine whether the *enſemble* be good. The *tout enſemble* of a painting, is that harmony which reſults from the diſtribution of the ſeveral objects or figures whereof it is compoſed.—"This picture is good, taking the parts ſeparately: but the *tout enſemble* is bad."

* See Botany, p. 1305.

ENSIFORMIS cartilago. See Xiphoides.

ENSIGN, in the military art, a banner or colours under which ſoldiers are ranged, according to the different companies or parties they belong to. See Flag, Colours, Standard, &c.

The Turkiſh enſigns are horſes tails; thoſe of the Europeans are pieces of taffety, with divers figures, colours, arms, and deviſes thereon. Xenophon tells us, that the enſign bore by the Perſians was a golden eagle on a white flag; the Corinthians bore the winged horſe, or Pegaſus, in theirs; the Athenians, an owl; the Meſſenians, the Greek letter M; the Lacedæmonians, the Λ. The Romans had a great diverſity of enſigns; the wolf, minotaur, horſe, boar, and at length the eagle, where they ſtopped: this was firſt aſſumed in the ſecond year of the conſulate of Marius †.—A military enſign on a medal of a Roman colony, denotes it a colony peopled with old ſoldiers.

Ensign is alſo the officer that carries the colours, being the loweſt commiſſioned officer in a company of foot, ſubordinate to the captain and lieutenant. It is a very honourable and proper poſt for a young gentleman at his firſt coming into the army: he is to carry the colours both in aſſault, day of battle, &c. and ſhould not quit them but with his life: he is always to carry them himſelf on his left ſhoulder: only on a march he may have them carried by a ſoldier. If the enſign is killed, the captain is to carry the colours in his ſtead.

Naval Ensign, a large ſtandard or banner hoiſted on a long pole erected over the poop, and called the *enſign ſtaff*.—The enſign is uſed to diſtinguiſh the ſhips of different nations from each other, as alſo to characteriſe the different ſquadrons of the navy. The Britiſh enſign in ſhips of war is known by a double croſs, *viz.* that of St George and St Andrew, formed upon a field which is either red, white, or blue.

ENSISHEIM, a town of France, in Upper Alſace. It is a pretty little place, well built, and conſiſts of about 200 houſes. E. Long. 7. 41. N. Lat. 47. 49.

ENT (Sir George), an eminent Engliſh phyſician, born at Sandwich in Kent in 1604. He was educated at Sidney college, Cambridge; and, afterwards travelling into foreign countries, received the degree of doctor of phyſic at Padua. After his return he obtained great practice, was made preſident of the college of phyſicians in London, and at length received the honour of knighthood from king Charles II. He was extremely intimate with Doctor Harvey; whom he learnedly defended in a piece entitled, "Apologia pro Circulatione Sanguinis, contra Æmilium Pariſanum." He alſo publiſhed, "Animadverſiones in Malachiæ Thruſtoni;" and ſome obſervations in the Philoſophical Tranſactions. Glanville, ſpeaking of his Plus Ultra of the modern improvements in anatomy, numbers Sir George Ent, Doctor Gliſſon, and Doctor Wallis, with the moſt celebrated diſcoverers in that ſcience. The two former were among the firſt members of the Royal Society. Sir George Ent died in October 1689.

ENTABLATURE, or Entablement, in architecture, is that part of an order of a column which is over the capital, and comprehends the architrave, frieze, and corniche. See Architecture, chap. i.

ENTABLER, in the menage, the fault of a horſe whoſe croupe goes before his ſhoulders in working upon volts; which may be prevented by taking hold of the right rein, keeping your right leg near, and removing your left leg as far from the horſe's ſhoulder as poſſible.

This is always accompanied with another fault called *aculer*. See Aculer.

ENTAIL, in law, ſignifies *fee tail*, or *fee entailed*; that is, abridged, curtailed, or limited to certain conditions. See Fee, and Tail.

ENTE', in heraldry, a method of marſhalling, more frequent abroad than with us, and ſignifying grafted or ingrafted.

We have, indeed, one inſtance of enté in the fourth grand quarter of his majeſty's royal enſign, whoſe blazon is Brunſwick and Lunenburg impaled with ancient Saxony, *enté en pointé*, "grafted in point."

ENTEROCELE, in ſurgery, a tumor formed by a prolapſion of the inteſtines through the rings of the abdomen and proceſſes of the peritonæum, into the ſcrotum. See Surgery.

ENTHUSIASM, a tranſport of the mind, whereby it is led to think and imagine things in a ſublime, ſurpriſing, yet probable manner. This is the enthuſiaſm felt in poetry, oratory, muſic, painting, ſculpture, &c.

Enthusiasm, in a religious ſenſe, implies a tranſport of the mind, whereby it fancies itſelf inſpired with ſome revelation, impulſe, &c. from heaven. Mr Locke gives the following deſcription of enthuſiaſm. "In all ages, men in whom melancholy has mixed with devotion, or whoſe conceit of themſelves has raiſed them into an opinion of a great familiarity with God, and a nearer admittance to his favour than is afforded to others, have often flattered themſelves with a perſuaſion of an immediate intercourſe with the Deity, and frequent communications from the Divine Spirit. Their minds being thus prepared, whatever groundleſs opinion comes to ſettle itſelf ſtrongly upon their fancies, is an illumination from the Spirit of God. And whatſoever odd action they find in themſelves a ſtrong inclination to do, that impulſe is concluded to be a call or direction from heaven, and muſt be obeyed. It is a commiſſion from above, and they cannot err in executing it. This I take to be properly enthuſiaſm, which, tho' ariſing from the conceit of a warm and overweening brain, works, when it once gets footing, more powerfully on the perſuaſions and actions of men, than either reaſon or revelation, or both together; men being moſt forwardly obedient to the impulſes they receive from themſelves." Devotion, when it does not lie under the check of reaſon, is apt to degenerate into enthuſiaſm. When the mind finds itſelf inflamed with devotion, it is apt to think that it is not of its own kindling, but blown up with ſomething divine within it. If the mind indulges this thought too far, and humours the growing paſſion, it at laſt flings itſelf into imaginary raptures and ecſtaſies; and when once it fancies itſelf under the influence of a divine impulſe, no wonder if it ſlights human ordinances, and refuſes to comply with the eſtabliſhed form of religion, as thinking itſelf directed by a much ſuperior guide.

ENTHUSIAST, a perſon poſſeſſed with enthuſiaſm. See the preceding article.

ENTHYMEME. See Logic, n° 93. and Oratory, n° 31.

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† See *Eagle*.

ENTITY, the ſame with Ens.

ENTREPAS, in the manege, a broken pace or going, that is neither walk nor trot, but has ſomewhat of an amble.

This is a pace or gait of ſuch horſes as have no reins or back, and go upon their ſhoulders; or, of ſuch as are ſpoiled in their limbs.

Entring-*Ladders*, in a ſhip, are of two ſorts; one uſed by the veſſel's ſides, in a harbour, or in fair weather, for perſons to go in and out of the ſhip: the other is made of ropes, with ſmall ſtaves for ſteps; and is hung out of the gallery to enter into the boat, or to come aboard the ſhip, when the ſea runs ſo high that they dare not bring the boat to the ſhip's ſide for fear of ſtaving it.

ENTROCHUS, in natural hiſtory, a genus of extraneous foſſils, uſually of about an inch in length, and made up of a number of round joints, which, when ſeparate and looſe, are called *trochitæ:* they are compoſed of the ſame kind of plated ſpar with the foſſile ſhells of the echini, which is uſually of a bluiſh-grey colour, and very bright where freſh-broken; they are all ſtriated from the centre to the circumference, and have a cavity in the middle. See Plate CI. fig. 4.

The entrochi are found of all ſizes, from that of a pin's head to a finger's length, and the thickneſs of one's middle finger; and are plainly of marine origin, having often ſea-ſhells adhering to them. They ſeem to be the petrified arms of that ſingular ſpecies of the ſea-ſtarfiſh, called *ſtella arboreſcens.*

They are eſteemed very powerful diuretics, and preſcribed in nephritic caſes with good ſucceſs; the doſe being as much of the powder as will lie on a ſhilling.

ENTRY, in law, ſignifies taking poſſeſſion of lands or tenements, where a perſon has a right ſo to do.

Entry *of an Heir*, in Scots law, that form of law by which an heir veſts in himſelf a proper title to his predeceſſor's eſtate. See *Precept of* Clare Constat.

Bill of Entry, in commerce. See Bill.

In making entries inwards, it is uſual for merchants to include all the goods they have on board the ſame ſhip in one bill, though ſometimes they may happen to be upwards of 20 ſeveral kinds; and in caſe the goods are ſhort entered, additional or poſt entries are now allowed; though formerly the goods, ſo entered, were forfeited. As to bills of entry outwards, or including goods to be exported, upon delivering them, and paying the cuſtoms, you will receive a ſmall piece of parchment called a *cocket*, which teſtifies your payment thereof, and all duties for ſuch goods.

If ſeveral ſorts of goods are exported at once, of which ſome are free, and others pay cuſtoms; the exporter muſt have two cockets, and therefore muſt make two entries; one for the goods that pay, and the other for the goods that do not pay cuſtom.

Entries of goods, on which a drawback is allowed, muſt likewiſe contain the name of the ſhip in which the goods were imported, the importer's name, and time of entry inwards. The entry being thus made, and an oath taken that the cuſtoms for thoſe goods were paid as the law directs, you muſt carry it to the collector and comptroller, or their deputies; who, after examining their books, will grant warrant, which muſt be given to the ſurveyor, ſearcher, or land-waiter, for them to certify the quantity of goods; after which the certificate muſt be brought back to the collector and comptroller, or their deputies, and oath made that the ſaid goods are really ſhipped, and not landed again in any part of Great Britain.

ENVELOPE, in fortification, a work of earth, ſometimes in form of a ſimple parapet, and at others like a ſmall rampart with a parapet: it is raiſed ſometimes on the ditch, and ſometimes beyond it.

ENVIRONNE', in heraldry, ſignifies ſurrounded with other things: thus, they ſay, a lion environné with ſo many bezants. See Bezant.

ENUMERATION, an account of ſeveral things, in which mention is made of every particular article.

Enumeration, in rhetoric, a part of peroration; in which the orator, collecting the ſcattered heads of what has been delivered throughout the whole, makes a brief and artful relation or recapitulation thereof.

ENVOY, a perſon deputed to negociate ſome affair with any foreign prince or ſtate. Thoſe ſent from the courts of Britain, France, Spain, &c. to any petty prince or ſtate, ſuch as the princes of Germany, the republics of Venice, Genoa, &c. go in quality of envoys, not ambaſſadors; and ſuch a character only do thoſe perſons bear, who go from any of the principal courts of Europe to another, when the affair they go upon is not very ſolemn or important. There are envoys ordinary and extraordinary, as well as ambaſſadors: they are equally under the protection of the law of nations, and enjoy all the privileges of ambaſſadors; only differing from them in this, that the ſame ceremonies are not performed to them.

ENVY, in ethics; pain felt, and malignity conceived, at the ſight of excellence or happineſs in another. See Emulation.

EPAMINONDAS, a celebrated Theban, the ſon of Polymnus, and one of the greateſt captains of antiquity. He learned philoſophy and muſic under Lyſis, a Pythagorean philoſopher; and was from his infancy inured to all the exerciſes of body and mind. He was learned, generous, well-ſkilled in war, brave, modeſt, and prudent; and had ſuch a regard for truth, that he would not tell a falſehood even in jeſt. He ſerved firſt under the Lacedemonians; ſaved the life of Pelopidas their chief, who received in a battle ſeven or eight wounds; and contracted a ſtrict friendſhip with that general, which laſted till his death. At his perſuaſions, Pelopidas delivered the city of Thebes from the yoke of the Spartans, who had rendered themſelves maſters of Cadmea, which occaſioned a bloody war between the two nations. Epaminondas was made general of the Thebans; on which he gained the celebrated battle of Leuctra, in which Cleombrotus, the valiant king of Sparta, was killed. He then ravaged the enemy's country, and cauſed the city of Meſſina to be rebuilt and peopled. At length, the command of the army was given to another, becauſe Epaminondas had kept his troops in the field four months longer than he had been ordered by the people; but, inſtead of retiring in diſguſt, he now ſerved as a common ſoldier, and diſtinguiſhed himſelf by ſo many brave actions, that the Thebans, aſhamed of having deprived him of the command, reſtored him to his poſt, in order to carry the war into Theſſaly, where his arms were always victorious. A war breaking out between the

Elians and the inhabitants of Mantinea; the Thebans took the part of the former. Epaminondas then reſolved to endeavour to ſurpriſe Sparta and Mantinea; but not ſucceeding, he gave the enemy battle, in which he received a mortal wound with a javelin, the bearded iron remaining in the wound. Knowing that it could not be drawn out without occaſioning immediate death, he would not ſuffer it to be touched, but continued to give his orders: and on his being told, that the enemy were entirely defeated, "I have lived long enough, he cried, ſince I die without being conquered;" and at the ſame time he plucked the javelin from his wound, and expired, 363 B. C.

EPANOLOPSIS. See Oratory, n° 73.

EPANODOS. *Ibid.* n° 75.

EPANORTHOSIS. *Ibid.* n° 86.

EPARER, in the manage, ſignifies the flinging of a horſe, or his yerking and ſtriking with his hind-legs.

EPAULEMENT, in fortification, a work raiſed to cover ſidewiſe, is either of earth, gabions, or faſcines loaded with earth. The epaulements of the places of arms for the cavalry, at the entrance of the trenches, are generally of faſcines mixed with earth.

EPENTHESIS, in grammar, the interpoſition or inſertion of a letter or ſyllable in the middle of a word; as *alituum*, for *alitum; relligio*, for *religio; induperator*, for *imperator*, &c.

EPEUS, of the line of Endymion, the inventor of the battering ram, an engine of great ſervice in ſieges to make a breach. He is thought to have built the Trojan horſe, and to have founded the city Metapontum.

EPHA, or Ephah, in Jewiſh antiquity, a meaſure for things dry, containing 10.961 of a buſhel.

EPHEMERA, from ἡμερα, "a day;" a diary fever, or fever of one day's continuance only. In this caſe, ſuch a heat as attends an exceſs of wine, a pulſe ſomewhat full and quick, but ſoft and regular, a ſlight head-ach, a nauſea, and reſtleſsneſs, are all the ſymptoms, and which terminate without any ſenſible evacuation. If it continue unto the third day, it is not a diary fever; and if the conſtitution is very dry, an hectic is to be dreaded.

Ephemera, the *Day-Fly*, in zoology, a genus belonging to the order of neuroptera. It has no teeth or palpæ; there are two large protuberances above the eyes; the wings are erect, the two hind ones being largeſt; and the tail is briſtly. There are 11 ſpecies, diſtinguiſhed by their colour and the number of briſtles in their tail. This fly derives its name from the circumſtance of its living but one day. They are ſeen flying about the ſurface of the water in mid-ſummer, for three days, and no longer; they eat nothing, and their only buſineſs is to drop their eggs on the water after they have copulated. Theſe eggs ſinking to the bottom, produce a ſort of worms or maggots; theſe ſoon hollow themſelves cavities in the clay, where they remain three years, growing every year about an inch in length. When the worm is come to its full growth, it riſes to the ſurface of the water, about ſix o'clock in the morning; and there iſſues from it this fly, which lays its eggs, and dies, about ſix o'clock the ſame night: ſo that the life of the creature in the fly-ſtate is only about 12 hours.

EPHEMERIDES, in literary hiſtory, an appellation given to thoſe books or journals, which ſhew the motions and places of the planets for every day of the year.

It is from the tables contained in theſe ephemerides that eclipſes, and all the variety of aſpects of the planets, are found.

EPHESUS, a city of antiquity, much celebrated on account of its temple of Diana, and for being the moſt famous mart or ſtaple town of Hither Aſia. It was enlarged and walled round by Lyſimachus and Pauſanias; and owed its increaſe of trade and riches to Lyſander the Lacedemonian. It is now ſubject to the Turks; and is ſtill a conſiderable city of Natolia, or Leſſer Aſia. E. Long. 27. 3. N. Lat. 38. 16.

EPHOD, in Jewiſh antiquity, one part of the prieſtly habit; being a kind of girdle, which, brought from behind the neck over the two ſhoulders, and hanging down before, was put croſs the ſtomach, then carried round the waiſt, and made uſe of as a girdle to the tunic.—There were two ſorts of ephods, one of plain linen for the prieſts, and the other embroidered for the high prieſt.

EPHORI, in Grecian antiquity, magiſtrates eſtabliſhed in ancient Sparta to balance the regal power. The authority of the ephori was very great. They ſometimes expelled and even put to death the kings, and aboliſhed or ſuſpended the power of the other magiſtrates, calling them to account at pleaſure. There were five of them, others ſay nine. They preſided in the public ſhews and feſtivals. They were entruſted with the public treaſure; made war and peace; and were ſo abſolute, that Ariſtotle makes their government equal to the prerogative of a monarchy. They were eſtabliſhed by Lycurgus.

EPHREM (Syrus), an ancient Chriſtian writer, in the fourth century, deacon of Edeſſa, was born at Niſibe, in Syria. He was greatly eſteemed by St Baſil, St Gregory Nyſſen, and other great men. He wrote againſt the opinions of Sabellius, Arius, Apollonarius, the Manichees, &c. and acquired ſuch reputation by his virtue and his works, that he was called the *doctor and the prophet of the Syrians*. He died in 378. The beſt editions of his works are, that of Oxford, in 1708, in folio, and that of Rome, from 1732 to 1736, in Syriac, Greek, and Latin, 6 vols folio.

EPHYDOR, in antiquity, an officer in the Athenian courts of juſtice, who was to provide the plaintiff and defendant with equal water hour-glaſſes. When the glaſs was run out, they were not permitted to ſpeak any farther; and, therefore, we find them very careful not to loſe or miſpend one drop of their water. Whilſt the laws quoted by them were reciting, or if any other buſineſs happened to intervene, they gave orders that the glaſs ſhould be ſtopped.

EPICHARMUS, an ancient poet and philoſopher, born in Sicily, was a ſcholar of Pythagoras. He and Phormus are ſaid to have invented comedy in Syracuſe. He preſented 55 plays. Horace commends Plautus for imitating him, in following the chace of the intrigue ſo cloſely as not to give the readers or ſpectators time to trouble themſelves with doubts concerning the diſcovery. He wrote likewiſe, treatiſes concerning philoſophy and medicine; but none of his works have been preſerved. He died aged 90, according to Laertius, who has preſerved four verſes inſcribed on his ſtatue.

EPIC, or Heroic, *Poem*, a poem expreſſed in narration, formed upon a ſtory partly real, and partly feigned; repreſenting, in a ſublime ſtyle, ſome ſignal and fortunate action, diſtinguiſhed by a variety of great events, to form the morals, and affect the mind with the love of heroic virtue.

We may diſtinguiſh three parts of the definition, namely, the matter, the form, and the end. The matter includes the action of the fable, under which are ranged the incidents, epiſodes, characters, morals, and machinery. The form comprehends the way or manner of the narration, whether by the poet himſelf, or by any perſons introduced, whoſe diſcourſes are related: to this branch likewiſe belong the moving of the paſſions, the deſcriptions, diſcourſes, ſentiments, thoughts, ſtyle, and verſification; and beſides theſe, the ſimilies, tropes, figures, and, in ſhort, all the ornaments and decorations of the poem. The end is to improve our morals, and increaſe our virtue. See Poetry, chap. ii.

EPICEDIUM, in ancient poetry, a poem rehearſed during the funeral ſolemnity of perſons of diſtinction.

EPICOENE, in grammar, a term applied to nouns, which, under the ſame gender and termination, mark indifferently the male and female ſpecies.

EPICTETUS, a celebrated Stoic philoſopher, born at Hierapolis in Phrygia, in the firſt century, was the ſlave of Epaphroditus, a freedman and one of Nero's guard. Domitian baniſhing all philoſophers from Rome, about the year 94, Epictetus retired to Nicopolis in Epirus, where he died in a very advanced age; and after his death, the earthen lamp he made uſe of ſold for 3000 drachmas. He was a man of great modeſty; which was eminent in his own practice, as well as in his recommendation to others: hence he uſed to ſay, "That there is no need of adorning a man's houſe with rich hangings or paintings, ſince the moſt graceful furniture is temperance and modeſty, which are laſting ornaments, and will never be the worſe for wearing." Of all the ancient philoſophers, he ſeems to have made the neareſt approaches to the Chriſtian morality, and to have had the moſt juſt ideas of God and providence. He always poſſeſſed a cool and ſerene mind, unruffled by paſſion; and was uſed to ſay, that the whole of moral philoſophy was included in theſe words, *ſupport* and *abſtain*. One day, his maſter Epaphroditus ſtrove in a frolic to wrench his leg; when Epictetus ſaid, with a ſmile, and free from any emotion, "If you go on, you will certainly break my leg:" but the former redoubling his effort, and ſtriking it with all his ſtrength, he at laſt broke the bone; when all the return Epictetus made was, "Did not I tell you, Sir, that you would break my leg?" No man was more expert at reducing the rigour of the maxims of the Stoics into practice. He conformed himſelf ſtrictly, both in his diſcourſe and behaviour, to the manners of Socrates and Zeno. He waged continual war with fancy and fortune; and it is an excellence peculiar to himſelf, that he admitted all the ſeverity of the Stoics without their ſourneſs, and reformed Stoiciſm as well as profeſſed it; and beſides his vindicating the immortality of the ſoul, as ſtrenuouſly as Socrates, or any Stoic of them all, he declared openly againſt ſelf-murder, the lawfulneſs of which was maintained by the reſt of the ſect. Arrian, his diſciple, wrote a large account of his life and death, which is loſt; and preſerved four books of his diſcourſes, and his Enchiridion, of which there have been ſeveral editions in Greek and Latin; and, in 1758, a tranſlation of them into Engliſh was publiſhed by the learned and ingenious Miſs Carter.

EPICUREAN philosophy, the doctrine or ſyſtem of philoſophy maintained by Epicurus and his followers.

His philoſophy conſiſted of three parts; canonical, phyſical, and ethereal. The firſt was about the canons or rules of judging. The cenſure which Tully paſſes upon him for his deſpiſing logic, will hold true only with regard to the logic of the Stoics, which he could not approve of, as being too full of nicety and quirk. Epicurus was not acquainted with the analytical method of diviſion and argumentation, nor was he ſo curious in modes and formation as the Stoics. Soundneſs and ſimplicity of ſenſe, aſſiſted with ſome natural reflections, was all his art. His ſearch after truth proceeded only by the ſenſes; to the evidence of which he gave ſo great a certainty, that he conſidered them as an infallible rule of truth, and termed them the *firſt natural light of mankind*.

In the ſecond part of this philoſophy he laid down atoms, ſpace, and gravity, as the firſt principles of all things: he did not deny the exiſtence of God, but thought it beneath his majeſty to concern himſelf with human affairs; he held him a bleſſed immortal Being, having no affairs of his own to take care of, and above meddling with thoſe of others.

As to his ethics, he made the ſupreme good of man to conſiſt in pleaſure, and conſequently ſupreme evil in pain. Nature itſelf, ſays he, teaches us this truth; and prompts us from our birth to procure whatever gives us pleaſure, and avoid what gives us pain. To this end he propoſes a remedy againſt the ſharpneſs of pain: this was to divert the mind from it, by turning our whole attention upon the pleaſures we have formerly enjoyed. He held that the wiſe man muſt be happy, as long as he is wiſe: the pain, not depriving him of his wiſdom, cannot deprive him of his happineſs.

There is nothing that has a fairer ſhew of honeſty than the moral doctrine of Epicurus. Gaſſendus pretends, that the pleaſure in which this philoſopher has fixed the ſovereign good, was nothing elſe but the higheſt tranquillity of mind in conjunction with the moſt perfect health of body: but Tully, Horace, and Plutarch, as well as almoſt all the fathers of the church, give us a very different repreſentation: indeed the nature of this pleaſure, in which the chief happineſs is ſuppoſed to be ſeated, is a grand problem in the morals of Epicurus. Hence there were two kinds of Epicureans, the rigid and the remiſs: the firſt were thoſe who underſtood Epicurus's notion of pleaſure in the beſt ſenſe, and placed all their happineſs in the pure pleaſures of the mind, reſulting from the practice of virtue: the looſe or remiſs Epicureans, taking the words of that philoſopher in a groſs ſenſe, placed all their happineſs in bodily pleaſures or debauchery.

Epicurus, the greateſt philoſopher of his age, was born at Gargettium in Attica, about 340 B. C. in the 109th Olympiad. He ſettled at Athens in a fine garden he had bought; where he lived with his friends in great tranquillity, and educated a great number of diſciples.

They lived all in common with their maſter. The reſpect which his followers paid to his memory is admirable: his ſchool was never divided, but his doctrine was followed as an oracle. His birth-day was ſtill kept in Pliny's time; the month he was born in was obſerved as a continued feſtival; and they placed his picture every where. He wrote a great many books, and valued himſelf upon making no quotations. He raiſed the atomical ſyſtem to a great reputation, though he was not the inventor of it, but had only made ſome change in that of Democritus. As to his doctrine concerning the ſupreme good or happineſs, it was very liable to be miſrepreſented, and ſome ill effects proceeded from thence, which diſcredited his ſect. He was charged with perverting the worſhip of the gods, and inciting men to debauchery; but he did not forget himſelf on this occaſion: he publiſhed his opinions to the whole world; he wrote ſome books of devotion; recommended the veneration of the gods, ſobriety, and chaſtity; and it is certain that he lived in an exemplary manner, and conformably to the rules of philoſophical wiſdom and frugality. Timocrites, a deſerter of his ſect, ſpoke very ſcandalouſly of him. Gaſſendus has given us all he could collect from the ancients concerning the perſon and doctrine of this philoſopher; who died of a ſuppreſſion of urine, aged 72.

EPICYCLE, in the ancient aſtronomy, a little circle whoſe centre is in the circumference of a greater circle: or it is a ſmall orb or ſphere, which being fixed in the deferent of a planet, is carried along with it; and yet, by his own peculiar motion, carries the planet faſtened to it round its proper centre.

It was by means of epicyles, that Ptolemy and his followers ſolved the various phenomena of the planets, but more eſpecially their ſtations and retrogradations.

EPICYCLOID, in geometry, a curve generated by the revolution of the periphery of a circle, along the convex or concave ſide of the periphery of another circle.

EPICYEMA, among phyſicians, denotes a ſuperfetation; being a falſe conception or mole happening after the birth of a regular fetus.

EPIDEMIA, in Grecian antiquity, feſtivals kept in honour of Apollo and Diana, at the ſtated ſeaſons when thoſe deities, who could not be preſent every where, were ſuppoſed to viſit different places, in order to receive the vows of their adorers.

EPIDEMIC, among phyſicians, an epithet of diſeaſes which at certain times are popular, attacking great numbers at or near the ſame time *.

EPIDENDRUM, in botany, a genus of the diandria order, belonging to the gynandria claſs of plants. This is the plant which produces the fruit called *vanilla*, and which is uſed in the making of chocolate. It is a native of Mexico and alſo of ſome parts of the Eaſt Indies. It is a paraſitic plant; the leaves of which greatly reſemble the vine, and are about 18 inches long and three inches broad. The flowers are of a white colour intermixed with ſtripes of red and yellow. When theſe fall off, they are quickly ſucceeded by the pods, which at firſt are green, but afterwards, as they ripen, become yellow, and are gathered for uſe. The pods of the beſt vanilla are long, ſlender, and well filled with ſeeds. If opened when freſh, the cavity of the pod is found to contain a humid ſubſtance that is black, oily, and balſamic, of ſuch a ſtrong ſmell, that it frequently cauſes head-achs, and even a ſort of temporary intoxication. The ſeaſon for gathering the pods begins about the latter end of September, and laſts till the end of December. They are dried in the ſhade; and when dry and fit for keeping, they are rubbed externally with a little oil of cocoa or calba, to render them ſupple, or preſerve them the better, and to prevent them from becoming too dry or brittle. The uſe of this fruit is only for perfuming chocolate. In New Spain it is reckoned unwholeſome; and therefore never uſed: but in England and other countries of Europe, it is a conſtant ingredient; and perhaps its noxious qualities may be corrected by the ſea-air. In thoſe countries where they grow, the plants are very eaſily propagated by cuttings. In this country they require to be kept in a ſtove, and alſo to be placed near ſome American tree, round which they may climb for their ſupport.

EPIDERMIS, in anatomy. See ANATOMY, n° 73.

EPIDIDYMIS, in anatomy. See ANATOMY, n° 371, c.

EPIGASTRIC REGION, a part or ſubdiviſion of the abdomen. See ANATOMY, n° 349, b.

EPIGLOTTIS, in anatomy, one of the cartilages of the larynx, or wind-pipe. See ANATOMY, n° 380, a.

EPIGRAM, in poetry, a ſhort poem in verſe, treating only of one thing, and ending with ſome lively, ingenious, and natural thought or point *.

EPIGRAPHE, among antiquarians, denotes the inſcription of a building, pointing out the time when, the perſons by whom, the uſes, and the like, for which it was erected.

EPILEPSY, in medicine, the ſame with what is otherwiſe called the *falling-ſickneſs*, from the patient's falling ſuddenly to the ground. See MEDICINE.

EPILEPSY, in farriery. See there, § ix.

EPILOBIUM, the WILLOW-HERB; a genus of the monogynia order, belonging to the octandria claſs of plants. There are ſeven ſpecies, all of them natives of Britain. They grow in marſhes, or under hedges in moiſt and ſhady places; having bloſſoms generally of a red colour, and ſometimes of conſiderable beauty. The moſt remarkable is the hirſutum, commonly called *codlins* and *cream*. The top-ſhoots of this plant have a very delicate fragrancy; but ſo tranſitory, that before they have been gathered five minutes, it is no longer perceptible. Horſes, ſheep, and goats eat this plant; cows are not fond of it; ſwine refuſe it.

EPILOGUE, in oratory, the end or concluſion of a diſcourſe, ordinarily containing a recapitulation of the principal matters delivered.

EPILOGUE, in dramatic poetry, a ſpeech addreſſed to the audience, after the play is over, by one of the principal actors therein; uſually containing ſome reflections on certain incidents in the play, eſpecially thoſe in the part of the perſon that ſpeaks it; and having ſomewhat of pleaſantry, intended to compoſe the paſſions raiſed in the courſe of the repreſentation: A practice which is ridiculed by the *Spectator*; and compared to a merry jigg upon the organ after a good ſermon, to wipe away any impreſſions that might have been made thereby, and ſend the people away juſt as they came.

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* See *Medicine*.

* See *Poetry*, n° 47.

EPIMEDIUM, barren-wort; a genus of the monogynia order, belonging to the tetrandria claſs of plants. There is only one ſpecies, viz. the alpinum. It is a low herbaceous plant, with a creeping root, having many ſtalks about nine inches high, each of which has three flowers compoſed of four leaves placed in the form of a croſs. They are of a reddiſh colour, with yellow ſtripes on the border.

EPIMENIDES, an ancient poet and philoſopher, was born at Gnoſſus in Crete. Contrary to the cuſtom of his country, he always wore his hair long; which, according to ſome, was becauſe he was aſhamed of being thought a Cretan: and indeed he does not ſeem to have had a high opinion of his countrymen, if that verſe cited by St Paul be, as it is generally believed to be, his; "The Cretans are always liars, evil beaſts, ſlow bellies." Many ſtories are related of him, too wonderful to merit attention; however, his reputation was ſo great over all Greece, that he was there eſteemed a favourite of the gods. The Athenians being afflicted with the plague, and commanded by the oracle to make a ſolemn luſtration of the city, ſent Nicias, the ſon of Niceratus, with a ſhip to Crete, to deſire Epimenides to come to them. He accepted their invitation, accompanied the meſſengers to Athens, performed the luſtration of the city, and the plague ceaſed. Here he contracted an acquaintance with Solon, whom he privately inſtructed in the proper methods for the regulation of the Athenian commonwealth. Having finiſhed his buſineſs at Athens, the citizens offered him many valuable preſents and high honours, and appointed a ſhip to carry him back to Crete: but he returned their preſents, and would accept of nothing except a little branch of the ſacred olive preſerved in the citadel; and deſired the Athenians to enter into an alliance with the Gnoſſians. Having obtained this, he returned to Crete; where he died ſoon after, aged 157 years; or as the Cretans, conſiſtently with their character, pretended, 299. He was a great poet, and wrote 5000 verſes on "the genealogy of the gods," 6500 "on the building of the ſhip Argos and Jaſon's expedition to Colchis," and 4000 "concerning Minos and Rhadamanthus." He wrote alſo in proſe, "Concerning ſacrifices and the commonwealth of Crete." St Jerom likewiſe mentions his "book of oracles and reſponſes." The Lacedemonians procured his body, and preſerved it among them by the advice of an oracle; and Plutarch tells us, that he was reckoned the ſeventh wiſe man by thoſe who refuſed to admit Periander into the number.

EPIPHANIUS (St), an ancient father of the church, born at Beſanducan, a village in Paleſtine, about the year 332. He founded a monaſtery near the place of his birth, and preſided over it. He was afterwards elected biſhop of Salamis; when he ſided with Paulinus againſt Meletius, and ordained in Paleſtine, Paulinian, the brother of St Jerom; on which a conteſt aroſe between him and John biſhop of Jeruſalem. He afterwards called a council in the iſland of Cyprus, in which he procured a prohibition of the reading of Origen's writings; and made uſe of all his endeavours to prevail on Theophilus, biſhop of Alexandria, to engage St Chryſoſtom to declare in favour of that decree: but not meeting with ſucceſs, he went himſelf to Conſtantinople, where he would not have any converſation with St Chryſoſtom; and formed the deſign of entering the church of the apoſtles, to publiſh his condemnation of Origen: but being informed of the danger to which he would be expoſed, he reſolved to return to Cyprus; but died at ſea, in the year 403. His were printed in Greek, at Baſil 1544, in folio; and were afterwards tranſlated into Latin, in which language they have been often reprinted. Petavius reviſed and corrected the Greek text by two manſcripts, and publiſhed it together with a new tranſlation at Paris in 1622. This edition was reprinted at Cologne in 1682.

EPIPHANY, a Chriſtian feſtival, otherwiſe called the *Manifeſtation of Chriſt to the Gentiles*, obſerved on the ſixth of January, in honour of the appearance of our Saviour to the three magi, or wiſe-men, who came to adore him and bring him preſents. The feaſt of epiphany was not originally a diſtinct feſtival; but made a part of that of the nativity of Chriſt, which being celebrated 12 days, the firſt and laſt of which were high or chief days of ſolemnity, either of theſe might properly be called *epiphany*, as that word ſignifies the appearance of Chriſt in the world.

The word in the original Greek, επιφανια, ſignifies *appearance* or *apparition*; and was applied, as ſome critics will have it, to this feaſt, on account of the ſtar which appeared to the magi.—St Jerom and St Chryſoſtom take the epiphany for the day of our Saviour's baptiſm, when he was declared to men by the voice, *Hic eſt filius meus dilectus, in quo mihi complacui*: "This is my beloved Son, in whom I am well pleaſed." And accordingly it is ſtill obſerved by the Cophtæ and Ethiopians in that view. Others contend, that the feaſt of Chriſtmas, or the nativity of our Saviour, was held in divers churches on this day; which had the denomination *epiphany*, or *appearance*, by reaſon of our Saviour's firſt appearance on earth at that time. And it muſt be allowed, that the word is uſed among the ancient Greek fathers, not for the appearance of the ſtar to the magi, but for that of our Saviour to the world: In which ſenſe, St Paul uſes the word *epiphania*, in his ſecond epiſtle to Timothy, c. i. v. 10.

EPIPHONEMA. See Oratory, n° 96.

EPIPHORA, in medicine, a preternatural defluxion of the eyes, when they continually diſcharge a ſharp ſerous humour, which excoriates the cheeks.

EPIPHYSIS, in anatomy. See Anatomy, n° 1. e.

EPIPLOCELE, in medicine, is a kind of hernia, or rupture, in which the omentum ſubſides into the ſcrotum.

EPIPLOOMPHALON, in medicine, an hernia umbilicalis, proceeding from the omentum falling into the region of the umbilicus or navel.

EPIPLOON. See Omentum.

EPIRUS, a diſtrict of ancient Greece, bounded on the eaſt by Etolia, on the weſt by the Adriatic, on the north by Theſſaly and Macedon, and on the ſouth by the Ionian ſea. This country was anciently governed by its own princes, in which ſtate it made a very conſiderable figure. The country, according to Joſephus, was firſt peopled by Dodanim the ſon of Javan and grandſon of Japhet. The people were very warlike: but they continued in their ſavage ſtate long after their neighbours were civilized; whence the Iſlanders uſed to threaten their offenders with tranſportation to Epirus. Their horſes were in great requeſt among the ancients, as well as the dogs produced in one of the diviſions called *Moloſſus*; and hence theſe dogs were called by the Romans *Moloſſi*.

The hiſtory of Epirus commences with the reign of Pyrrhus the ſon of Achilles by Deidamia the daughter of Lycomedes king of Scyros. He is ſaid to have behaved with great bravery at the ſiege of Troy; but it would appear that he behaved with no leſs barbarity. After the city was taken, he is ſaid to have killed old king Priam with his own hand; to have thrown Aſtyanax the ſon of Hector and Andromache headlong from an high tower; and ſacrificed Polyxena the daughter of Priam on the tomb of his father. He carried Andromache with him into Epirus, where he ſettled by the advice of the famous ſoothſayer Helenus, one of Priam's ſons, who had ſerved during the Trojan war both under his father and himſelf. The only remarkable period of the hiſtory of Epirus is the reign of Pyrrhus II. who made war upon the Romans. He was invited into Italy by the Tarentines; and embarked about 280 B.C. After having eſcaped many dangers by ſea, he landed in that country, and with great difficulty gained a victory over the Romans; but he was afterwards utterly defeated by them *, and obliged to return into his own country. To retrieve his honour, he then undertook an expedition againſt Macedon; where he overthrew Antigonus, and at laſt made himſelf maſter of the whole kingdom. He then formed a deſign of ſubduing all the other Grecian ſtates; but met with ſuch an obſtinate reſiſtance at Lacedæmon, that he was obliged to drop the enterprize; and was ſoon after killed at the ſiege of Argos, by a woman, who from the wall threw a tile upon his head. Deidamia, the grand-daughter of Pyrrhus, was the laſt that ſat on the throne of Epirus. She is ſaid to have been murdered after a ſhort reign; upon which the Epirots formed themſelves into a republic.

Under the new form of government Epirus never made any conſiderable figure, but ſeems rather to have been dependent on the kingdom of Macedon. The Romans having conquered Philip king of that country, reſtored the Epirots to their ancient liberty; but they, forgetful of this favour, ſoon after took up arms in favour of Perſeus. As a puniſhment for this ingratitude, the Romans gave orders to Paulus Emilius, after the reduction of Macedon, to plunder the cities of Epirus, and level them with the ground. This was punctually executed throughout the whole country on the ſame day, and at the ſame hour. The booty was ſold, and each foot-ſoldier had 200 denarii, that is, ſix pounds nine ſhillings and two pence, and each of the horſe the double of this ſum. An hundred and fifty thouſand men were made ſlaves, and ſold to the beſt bidder for the benefit of the republic. Nor did the vengeance of Rome ſtop here; all the cities of Epirus, to the number of 70, were diſmantled, and the chief men of the country carried to Rome, where they were tried, and moſt of them condemned to perpetual impriſonment. After this terrible blow, Epirus never recovered its ancient ſplendor. Upon the diſſolution of the Achæan league, it was made part of the province of Macedon; but, when Macedon became a dioceſe, Epirus was made a province of itſelf, called the province of *Old Epirus*, to diſtinguiſh it from *New Epirus*, another province lying to the eaſt of it. On the diviſion of the empire, it fell to the emperors of the eaſt, and continued under them till the taking of Conſtantinople by the Latins, when Michael Angelus, a prince nearly related to the Greek emperor, ſeized on Etolia and Epirus, of which he declared himſelf deſpote or prince; and was ſucceeded by its brother Theodorus, who took ſeveral towns from the Latins, and ſo far enlarged his dominions, that, diſdaining the title of *deſpote*, he aſſumed that of *emperor*, and was crowned by Demetrius archbiſhop of Bulgaria. Charles, the laſt prince of this family, dying without lawful iſſue, bequeathed Epirus and Acarnania to his natural ſons, who were driven out by Amurath the ſecond. Great part of Epirus was afterwards held by the noble family of the Caſtriots; who, though they were maſters of all Albania, yet ſtyled themſelves princes of Epirus. Upon the death of the famous George Caſtriot, ſurnamed *Scanderbeg*, Epirus fell to the Venetians, who were ſoon diſpoſſeſſed of it by the Turks; in whoſe hands it ſtill continues, being now known by the name of *Albania*, which comprehends the Albania of the ancients, all Epirus, and that part of Dalmatia which is ſubject to the Turks.

EPISCOPACY, the government of the church by biſhops. See the word Biſhop.—In that article, when deſcribing the office and power of biſhops in the firſt ages, we followed Mr Peter King's Account of the *Conſtitution of the Ancient Church*; and conſidered them only as paſtors of a ſingle congregation. But here a regard to impartiality obliges us to acknowledge, that we were not then acquainted with Mr Slater's Anſwer to that performance, in his *Original Draught of the Primitive Church*; where it is ſhown, that, at the time Mr Peter King alludes to, biſhops had more than one, ſometimes many congregations, with their clergy, under their care. As to the abſolute validity of his reaſoning, however, or how far it is capable of being redargued, we muſt leave our polemical readers to judge from a peruſal of the books themſelves.

EPISCOPAL, ſomething belonging to biſhops.

EPISCOPALIANS, in church-hiſtory, an appellation given to thoſe who prefer the epiſcopal government and diſcipline to all others. See Episcopacy.

By the teſt act, none but Epiſcopalians, or members of the church of England, are qualified to enjoy any office civil or military.

EPISCOPIUS (Simon), one of the moſt learned men of the 17th century, and the chief ſupporter of the Arminian ſect, was born at Amſterdam in 1583. In 1612, he was choſen divinity profeſſor at Leyden, in the room of Gomarus, who reſigned; and the functions of his office, with his private ſtudies, were light burdens to him, compared with the difficulties he ſuſtained on account of the Arminian controverſy: which, though it began in the univerſities, ſoon flew to the pulpits, from whence it ſpread and inflamed the people. The ſtates of Holland having invited Epiſcopius to take his place at the ſynod of Dort, he went thither accompanied by ſome remonſtrant miniſters; but the ſynod would not allow them to ſit as judges, nor to appear in any other capacity than as perſons ſummoned before them: they ſubmitted, were depoſed from their functions, and baniſhed the territories of the commonwealth. Epiſcopius and his perſecuted bre-

* See Rome.

thren retired to Antwerp; but the times growing more favourable, he returned to Holland in 1626, and was made miniſter of the church of the Remonſtrants at Rotterdam: in 1634, he was choſen rector of the college founded by his ſect at Amſterdam, where he ſpent the remainder of his days. He died in 1643, of the ſame diſorder which had killed his wife before, a retention of urine; having loſt his ſight ſome weeks previous to his end. The learned have beſtowed great eulogiums on Epiſcopius; but he did not always write with that moderation which might have been wiſhed. His works make two volumes in folio, of which the ſecond conſiſts of poſthumous publications.

EPISCOPUS, the ſame with biſhop. See Bishop and Episcopacy.

EPISODE, in poetry, a ſeparate incident, ſtory, or action, which a poet invents, and connects with his principal action, that his work may abound with a greater diverſity of events; though, in a more limited ſenſe, all the particular incidents whereof the action or narration is compounded, are called *epiſodes*. See Poetry, chap. ii. 19.

EPISPASTIC, in medicine, a topical remedy, which being applied to the external parts of the body, attracts the humours to that part.

EPISTATES, in the Athenian government, was the preſident of the proedri. See Proedri.

EPISTEMONARCH, in the ancient Greek church, an officer of great dignity, who had the care of every thing relating to faith, in the quality of cenſor. His office anſwered pretty nearly to that of maſter of the ſacred palace at Rome.

EPISTLE, denotes the ſame with a miſſive letter; but is now chiefly uſed in ſpeaking of ancient writings, as the epiſtles of St Paul, epiſtles of Cicero, epiſtles of Pliny, &c.

Epistles *and Goſpels*, in the liturgy of the church of England, are ſelect portions of ſcripture, taken out of the writings of the evangeliſts and apoſtles, and appointed to be read, in the communion-ſervice, on Sundays and holidays. They are thought to have been ſelected by St Jerom, and by him put into the lectionary. It is certain, they were very anciently appropriated to the days whereon we now read them, ſince they are not only of general uſe throughout the weſtern church, but are alſo commented upon in the homilies of ſeveral ancient fathers, which are ſaid to have been preached upon thoſe very days to which theſe portions of ſcripture are now affixed.

The epiſtles and goſpels are placed in an admirable order and method, and bear a ſpecial relation to the ſeveral days whereon they are read. The year is diſtinguiſhed into two parts; the firſt being deſigned to commemorate Chriſt's living among us, the other to inſtruct us to live after his example. The former takes in the whole time from Advent to Trinity-Sunday; the latter, all the Sundays from Trinity to Advent. During the firſt of theſe ſeaſons, the epiſtles and goſpels are calculated to raiſe in us a grateful ſenſe of what our Saviour did and ſuffered for us, and ſet before our eyes his nativity, circumciſion, and manifeſtation to the Gentiles; his doctrines, and miracles; his baptiſm, faſting, and temptation; his agony and bloody ſweat; his croſs and paſſion; his death, burial, reſurrection, and aſcenſion; and his miſſion of the Holy Ghoſt. During the ſecond ſeaſon of the year, the epiſtles and goſpels tend to inſtruct us in the true paths of Chriſtianity. See Collects.

EPISTOLARY, ſomething belonging to an epiſtle. See Epistle.

Epistolary *Compoſition*. See Letter; and Poetry, n° 76, &c.

EPISTROPHE. See Oratory, n° 71.

EPISTYLE, in the ancient architecture, a term uſed by the Greeks for what we call *architrave*, viz. a a maſſive piece of ſtone or wood, laid immediately over the capital of a column.

EPITAPH, a monumental inſcription in honour or memory of a perſon defunct. See Poetry, n° 102.

EPITASIS, in ancient poetry, the ſecond part or diviſion of a dramatic poem, wherein the plot, entered upon in the firſt part, or protaſis, was carried on, heightened, and worked up, till it arrived at its ſtate, or height, called *cataſtaſis*.

Epitasis, in medicine, the increaſe of a diſeaſe, or beginning of a paroxyſm, particularly in a fever.

EPITHALAMIUM, in poetry, a nuptial ſong, or compoſition, in praiſe of the bride and bridegroom, praying for their proſperity, for a happy offſpring, &c.

Among the Greeks, the married couple were no ſooner bedded, than the young men and maids gathered round the door, dancing and ſinging the epithalamium, ſhouting, and ſtamping with their feet, with intention to drown the maid's cries.

EPITHEM, in pharmacy, a kind of fomentation, or remedy of a ſpirituous or aromatic kind, applied externally to the regions of the heart, liver, &c. to ſtrengthen and comfort the ſame, or to correct ſome intemperature thereof. See Pharmacy, n° 1015, &c.

EPITHET, in poetry and rhetoric, an adjective expreſſing ſome quality of a ſubſtantive to which it is joined; or ſuch an adjective as is annexed to ſubſtantives by way of ornament and illuſtration, not to make up an eſſential part of the deſcription. Nothing, ſays Ariſtotle, tires the reader more than too great a redundancy of epithets, or epithets placed improperly; and yet nothing is ſo eſſential in poetry as a proper uſe of them. The writings of the beſt poets are full of them.

EPITOME, in literary hiſtory, the ſame with Abridgement.

EPITRITUS, in proſody, a foot conſiſting of three long ſyllables and one ſhort. Of theſe, grammarians reckon four kinds: the firſt conſiſting of an iambus and ſpondee, as ſălūtāntēs; the ſecond, of a trocheus and ſpondee, as cōncĭtātī; the third, of a ſpondee and an iambus, as cōmmūnĭcāns; and the fourth, of a ſpondee and trocheus, as īncāntārĕ. See the articles Spondeus, Trocheus, &c.

EPITROPE. See Oratory, n° 83.

EPIZEUXIS. *Ibid.* n° 68.

EPOCHA, in chronology, a term or fixed point of time whence the ſucceeding years are numbered or counted. See Æra.

EPODE, in lyric poetry, the third or laſt part of the ode, the ancient ode being divided into ſtrophe, antiſtrophe, and epode. See Ode, &c.

The epode was ſung by the prieſts, ſtanding ſtill before the altar, after all the turns and returns of the ſtrophe and antiſtrophe, and was not confined to any preciſe number or kind of verſes.

The epode is now a general name for all kinds of little verſes that follow one or more great ones, of what kind ſoever they be: and in this ſenſe, a pentameter is an epode after an hexameter. And as every little verſe, which, being put after another, cloſes the period, is called *epode*; hence the ſixth book of Horace's odes is entitled *liber epodon*, "book of epodes," becauſe the verſes are all alternately long and ſhort, and the ſhort ones generally, though not always, cloſe the ſenſe of the long one.

EPOPOEIA, in poetry, the hiſtory, action, or fable, which makes the ſubject of an epic poem. The word is derived from the Greek, εϖος, *carmen*, "verſe;" and ϖοιεω, *facio*, "I make."

In the common uſe of the word, however, *epopœia* is the ſame with *epos*, or epic poem itſelf. See the article Poetry.

EPOPS, or Hoopoe. See Upupa.

EPSOM, a town of Surry, about 15 miles ſouth-weſt of London: much reſorted to on account of its medicinal waters; from which the bitter purging ſalt being firſt extracted, got the name of *Epſom ſalt* †.

EPULONES, in Roman antiquity, miniſters who aſſiſted at the ſacrifices, and had the care of the ſacred banquet committed to them.

EQUABLE, an appellation given to ſuch motions as always continue the ſame in degree of velocity, without being either accelerated or retarded.

EQUAL, a term of relation between two or more things of the ſame magnitude, quantity, or quality.

Mathematicians ſpeak of *equal* lines, angles, figures, circles, ratios, ſolids.

EQUALITY, that agreement between two or more things, whereby they are denominated equal.

EQUANIMITY, in ethics, denotes that even and calm frame of mind and temper, under good or bad fortune, whereby a man appears to be neither puffed up nor overjoyed with proſperity, nor diſpirited, ſoured, or rendered uneaſy by adverſity.

EQUATION, in algebra. See Algebra, ſect. ii.

Equation *of Time*, in aſtronomy and chronology, the reduction of the apparent time or motion of the ſun, to equable, mean, or true time †.

EQUATOR, in geography, a great circle of the terreſtrial globe, equidiſtant from its poles, and dividing it into two equal hemiſpheres; one north, and the other ſouth. See Geography.

EQUERRY, in the Britiſh cuſtoms, an officer of ſtate, under the maſter of the horſe.

There are five equerries, who ride abroad with his majeſty: for which purpoſe they give their attendance monthly, one at a time, and are allowed a table.

As to the equerries of the crown ſtable, they have this diſtinct appellation, as being employed in mounting, managing, and breaking the ſaddle-horſes for his majeſty's uſe, and holding his ſtirrup.

EQUES auratus, is uſed for a knight bachelor, called *auratus*, q. d. *gilt*, becauſe anciently none but knights were allowed to beautify their armour, or other habiliments for war, with gold.

EQUESTRIAN statue, ſignifies the ſtatue of a perſon mounted on horſeback.

Equestrian *Order*, among the Romans, ſignified their knights, or equites; as alſo their troopers, or horſemen in the field: the firſt of which orders ſtood in contradiſtinction to the ſenators; as the laſt did to the foot, military, or infantry. Each of theſe diſtinctions was introduced into the ſtate by Romulus.

EQUIANGULAR, in geometry, an epithet given to figures whoſe angles are all equal: ſuch are a ſquare, an equilateral triangle, &c.

EQUICRURAL, in geometry. See Isosceles.

EQUIDISTANT, an appellation given to things placed at equal diſtances from ſome fixed point, or place, to which they are referred.

EQUILATERAL, in general, ſomething that hath equal ſides; as an equilateral triangle.

EQUILIBRIUM, in mechanics, is when the two ends of a lever or balance hang ſo exactly even and level, that neither doth aſcend or deſcend, but both keep in a poſition parallel to the horizon; which is occaſioned by their being both charged with an equal weight.

EQUIMULTIPLES, in arithmetic and geometry, are numbers or quantities multiplied by one and the ſame number or quantity. Hence, equimultiples are always in the ſame ratio to each other, as the ſimple quantities before multiplication: thus, if 6 and 8 are multiplied by 4, the equimultiples 24 and 32 will be to each other as 6 to 8.

EQUINOCTIAL, in aſtronomy, a great circle of the celeſtial globe, whoſe poles are the poles of the world. See Astronomy and Geography.

EQUINOX, the time when the ſun enters either of the equinoctial points, where the ecliptic interſects the equinoctial. See Astonomy, nº 135.

Preceſſion of the Equinoxes. See Astronomy, nº 137.

EQUISETUM, Horse-tail; a genus of the order of filices, belonging to the cryptogamia claſs of plants. There are ſeven ſpecies, of which the moſt remarkable are, 1. The ſylvaticum, or wood horſe-tail. It grows in woods and moiſt ſhady places in many parts of England and Scotland. The ſtalk riſes from 12 to 18 inches high, angular, and rough to the touch; the angles being edged with ſharp *ſpiculæ*, ſcarce viſible without a microſcope. The leaves grow verticillate, 12 or more in a whorl, and theſe whorls are about an inch diſtant from one another. The leaves are very ſlender, nearly quadrangular, about five inches long, pendent, and beſet with ſeveral other ſecondary whorls, ſo that it reſembles a pine-tree in miniature. Horſes are very fond of this plant, and in ſome parts of Sweden it is collected to ſerve them as winter food. 2. The arvenſe, common or corn horſe-tail, grows in wet meadows and corn-fields. The moſt remarkable property of this is, that its ſeeds, when viewed by a miſcroſcope, are ſeen to leap about as if they were animated. It has a very aſtringent and diuretic quality, and has been eſteemed ſerviceable in the *hæmaturia* and *gonorrhœa*, but is diſregarded by the preſent practice. It is a troubleſome plant in paſtures; and diſagreeable to cows, being never touched by them unleſs they are compelled by hunger, and then it brings on an incurable diarrhœa. It does not ſeem to affect horſes or ſheep. 3. The paluſtre, marſh horſe-tail, or paddock pipe, is frequent in marſhes and ditches. It is not ſo rough as the former, but is likewiſe prejudicial to cattle. 4. The fluviatile, or great river horſe-tail is frequent in ſhady marſhes, and on the brinks of ſtagnant waters. It is the largeſt of all the ſpecies, growing ſometimes to the height of a yard, and near an inch in diameter. Haller tells us, that this kind of equiſetum was eaten by the Romans; and Linnæus affirms, that oxen and rein-deer are fond of it, but that horſes refuſe it. 5. The hyemale, rough horſe-tail, ſhave-graſs, or Dutch ruſhes. This is much uſed by the whiteſmiths and cabinet-makers, under the name of *Dutch ruſhes*, for poliſhing their metals and wood. All the other ſpecies will anſwer this purpoſe in ſome degree, but the laſt better than any of the reſt. In Northumberland the dairy-maids ſcour and clean their milk-pails with it. Some imagine, that if cows are fed with this ſpecies, their teeth will fall out.

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† See Chemiſtry, nº 139.

† See Aſtronomy, nº 181.

EQUITY, in a general ſenſe, the virtue of treating all other men according to reaſon and juſtice, or as we would gladly be treated ourſelves when we underſtand aright what is our due. See **Justice**.

Equity, in juriſprudence, is defined a correction or qualification of the law, generally made in that part wherein it faileth or is too ſevere. It likewiſe ſignifies the extenſion of the words of the law to caſes unexpreſſed, yet having the ſame reaſon; ſo that where one thing is enacted by ſtatute, all other things are enacted that are of the like degree. For example, the ſtatute of *Glouc.* gives action of waſte againſt him that holds lands for life or years; and, by the equity thereof, a man ſhall have action of waſte againſt a tenant that holds but for one year, or one half-year, which is without the words of the act, but within the meaning of it; and the words that enact the one, by *equity* enact the other. So that equity is of two kinds. The one abridges and takes from the letter of the law: the other enlarges and adds to it; and ſtatutes may be conſtrued according to equity, eſpecially where they give remedy for wrong, or are for expedition of juſtice. Equity ſeems to be the interpoſing *law of reaſon*, exerciſed by the lord chancellor in extraordinary matters to do equal juſtice, and, by ſupplying the defects of the law, gives remedy in all caſes. See **Chancery**. [See alſo *Blackſt. Comment.* vol. i. 61, 91. vol. iii. 49, 429, 436. vol. iv. 435.]

EQUIVALENT, an appellation given to things which agree in nature or other circumſtance; as *force*, *virtue*, &c.

EQUIVOCAL terms or words, among logicians, are thoſe which have a doubtful or double meaning.

According to Mr Locke, the doubtfulneſs and uncertainty of words has its cauſe more in the ideas themſelves, than in any incapacity of the words to ſignify them; and might be avoided, would people always uſe the ſame term to denote the ſame idea, or collection of ideas: but, adds he, it is hard to find a diſcourſe on any ſubject where this is the caſe; a practice which can only be imputed to folly, or great diſhoneſty; ſince a man, in making up his accounts, might with as much fairneſs uſe the numeral characters ſometimes for one ſometimes for another collection of units.

Equivocal *Generation*, the production of animals without the intercourſe between the ſexes, by the influence of the ſun or ſtars, &c.

This kind of generation is now quite exploded by the learned.

EQUULEUS, or **Ecculeus**, in antiquity, a kind of rack uſed for extorting a confeſſion, at firſt chiefly practiſed on ſlaves, but afterwards made uſe of againſt the Chriſtians.

The equuleus was made of wood, having holes at certain diſtances, with a ſcrew, by which the criminal was ſtretched to the third, ſometimes to the fourth, or fifth holes, his arms and legs being faſtened on the equuleus with cords; and thus was hoiſted aloft, and extended in ſuch a manner, that all his bones were diſlocated. In this ſtate red-hot plates were applied to his body, and he was goaded in the ſides with an inſtrument called *ungula*.

Equulus, in aſtronomy. See **Astronomy**, n° 206.

EQUUS, the **Horse**, in zoology, a genus of quadrupeds belonging to the order of belluæ. This genus comprehends the horſe, the aſs, and the zebra; they have ſix erect and parallel fore-teeth in the upper jaw, and ſix ſomewhat prominent ones in the under jaw; the dog-teeth are ſolitary, and at a conſiderable diſtance from the reſt; and the feet conſiſt of an undivided hoof. The horſe is a domeſtic animal; and the figure and dimenſions of his body are ſo well known, that a general deſcription is altogether unneceſſary. We ſhall therefore confine ourſelves to the natural hiſtory of this noble animal.

Buffon, Hiſtoire Naturelle.

The horſe, in a domeſtic ſtate, is a bold and fiery animal; equally intrepid as his maſter, he faces danger and death with ardour and magnanimity. He delights in the noiſe and tumult of arms, and ſeems to feel the glory of victory: he exults in the chaſe; his eyes ſparkle with emulation in the courſe. But though bold and intrepid, he is docile and tractable: he knows how to govern and check the natural vivacity and fire of his temper. He not only yields to the hand, but ſeems to conſult the inclination of his rider. Conſtantly obedient to the impreſſions he receives, his motions are entirely regulated by the will of his maſter. He in ſome meaſure reſigns his very exiſtence to the pleaſure of man. He delivers up his whole powers; he reſerves nothing; he will rather die than diſobey. Who could endure to ſee a character ſo noble abuſed! who could be guilty of ſuch groſs barbarity!

This character, though natural to the animal, is in ſome meaſure the effect of education. His education commences with the loſs of liberty, and it is finiſhed by conſtraint. The ſlavery of the horſe is ſo ancient and ſo univerſal, that he is but rarely ſeen in a natural ſtate. Several ancient writers talk of wild horſes, and even mention the places where they were to be found. Herodotus takes notice of white ſavage horſes in Scythia; Ariſtotle ſays, they are to be found in Syria; Pliny, in the northern regions; and Strabo, in Spain and the Alps. Among the moderns, Cardan ſays, that wild horſes are to be found in the Highlands of Scotland and the Orkney iſles; Olaus, in Muſcovy; Dapper, in the iſland of Cyprus; Leo and Marmol, in Arabia and Africa, &c. But as Europe is almoſt equally inhabited, wild horſes are not to be met with in any part of it: and thoſe of America were originally tranſported from Europe by the Spaniards; for this ſpecies of animals did not exiſt in the new world. The Spaniards carried over a great number of horſes, left them in different iſlands, &c. with a view to propagate that uſeful animal in their colonies. Theſe have multiplied incredibly in the vaſt deſarts of thoſe thinly peopled countries,

Equus.
The horſe.

tries, where they roam at large, without any reſtraint. M. de Salle relates, that he ſaw, in the year 1685, horſes feeding in the meadows of North America, near the bay of St Louis, which were ſo ferocious that nobody durſt come near them. Oexmelin ſays, that he has ſeen large troops of them in St Domingo running in the valleys; that when any perſon approached, they all ſtopped; and one of them would advance till within a certain diſtance, then ſnort with his noſe, take to his heels, and the whole troop after him. Every author who takes notice of theſe horſes of America, agree that they are ſmaller and leſs handſome than thoſe of Europe. Theſe relations ſufficiently prove, that the horſe, when at full liberty, though not a fierce or dangerous animal, has no inclination to aſſociate with mankind; that all the ſoftneſs and ductility of his temper proceeds entirely from the culture and poliſh he receives in his domeſtic education, which in ſome meaſure commences as ſoon as he is brought forth.

The motions of the horſe are chiefly regulated by the bit and the ſpur; the bit informs him how to direct his courſe, and the ſpur quickens his pace. The mouth of the horſe is endowed with an amazing ſenſibility: the ſlighteſt motion or preſſure of the bit gives him warning, and inſtantly determines his courſe.

The horſe has not only a grandeur in his general appearance, but there is the greateſt ſymmetry and proportion in the different parts of his body. The regularity and proportion of the different parts of the head gives him an air of lightneſs, which is well ſupported by the ſtrength and beauty of his cheſt. He erects his head, as if willing to exalt himſelf above the condition of other quadrupeds: his eyes are open and lively; his ears are handſome, and of a proper height; his mane adorns his neck, and gives him the appearance of ſtrength and boldneſs.

At the age of two years, or two years and a half, the horſe is in a condition to propagate; and the mare, like moſt other females, is ready to receive him ſtill ſooner. But the foals produced by ſuch early embraces are generally ill-made and weakly. The horſe ſhould never be admitted to the mare till he is four or four and a half; this is only meant with regard to draught-horſes. Fine horſes ſhould not be admitted to the mare before they be ſix years old; and Spaniſh ſtallions not till ſeven. The mares are generally in ſeaſon from the beginning of April to the end of March; but their chief ardour for the horſe laſts but about 15 or 20 days, and this critical ſeaſon ſhould always be embraced. The ſtallion ought to be ſound, well made, vigorous, and of a good breed. For fine ſaddle-horſes, foreign ſtallions, as Arabians, Turks, Barbs, and Andalouſians, are preferable to all others. Next to theſe, Britiſh ſtallions are the beſt; becauſe they originally ſprang from thoſe above-mentioned, and are very little degenerated. The ſtallions of Italy, and eſpecially the Neapolitans, are very good. The beſt ſtallions for draught or carriage horſes, are thoſe of Naples, Denmark, Holſtein, and Freezeland. The ſtallions for ſaddle-horſes ſhould be from 14 to 15 hands high, and for draught-horſes at leaſt 15 hands. Neither ought the colour of ſtallions to be overlooked; as a fine black, grey, bay, ſorrel, &c. Beſides theſe external qualities, a ſtallion ought to have courage, tractability, ſpirit, agility, a ſenſible mouth, ſure limbs, &c. Theſe precautions in the choice of a ſtallion are the more neceſſary, becauſe he has been found by experience to communicate to his offſpring almoſt all his good or bad qualities, whether natural or acquired.

The mare contributes leſs to the beauty of her offſpring than the ſtallion; but ſhe contributes perhaps more to their conſtitution and ſtature: for theſe reaſons, it is neceſſary that the mares for breed be perfectly ſound, and make good nurſes. For elegant horſes, the Spaniſh and Italian mares are beſt; but, for draught-horſes, thoſe of Britain and Normandy are preferable. However, when the ſtallions are good, the mares of any country will produce fine horſes, provided they be well made and of a good breed.

Mares go with young eleven months and ſome days. They bring forth ſtanding; contrary to the courſe of moſt other quadrupeds, who lie during this operation. They continue to bring forth till the age of 16 or 18 years; and both horſes and mares live between 25 and 30 years. Horſes caſt their hair once a-year, generally in the ſpring, but ſometimes in the autumn. At this time they are weak, and require to be better fed and taken care of than at any other ſeaſon.

In Perſia, Arabia, and moſt eaſtern countries, they never geld their horſes, as is done in Europe and China. This operation greatly diminiſhes their ſtrength, courage, and ſpirit; but it makes them good humoured, gentle, and tractable. With regard to the time of performing this operation, the practice of different countries is different: ſome geld their horſes when a year old, and others at 18 months. But the beſt and moſt general practice is to delay the operation till they be two years old at leaſt; becauſe, when the gelding is delayed for two years or more, the animals retain more of the ſtrength and other qualities which naturally belong to the male.

As the utility of horſes ſurpaſſes that of all other domeſtic animals, it may be of uſe to ſubjoin ſome marks by which the age and other properties of horſes may be diſtinguiſhed.

In old horſes, the eye-pits are generally deep; but this is only an equivocal mark, being alſo found in young horſes begot by old ſtallions. The moſt certain knowledge of the age is to be obtained from the teeth. Of theſe a horſe has 40; 24 grinders or double-teeth, four tuſhes, and 12 fore-teeth: mares have no tuſhes, or at leaſt very ſhort ones. It is not from the grinders that we know the age; it is diſcovered firſt by the fore-teeth, and afterwards by the tuſhes. The 12 fore-teeth begin to ſhoot within 12 days after the colt is foaled. Theſe firſt, or foal-teeth, are round, ſhort, not very ſolid, and are caſt at different times, to be replaced by others. At the age of two years and a half, the four middle fore-teeth are caſt, two in the upper jaw, and two in the lower. In one year more, four others drop out, one on each ſide of the former, which are already replaced. When he is about four years and a half old, he ſheds four others, and always next to thoſe which have fallen out and been replaced. Theſe four foal-teeth are replaced by four others, but are far from growing ſo faſt as thoſe which replaced the eight former, and are called the *corner-teeth*: they replace the four laſt foal-teeth, and by theſe the age of a horſe is diſcovered. They are eaſily known, being the third both above and below, counting from the middle of the jaw. They are hollow, and have a black mark in their cavity. When the horſe is four years and a half old, they are ſcarce viſible above the gum, and the cavity is very ſenſible: at ſix and a half, they begin to fill; and the mark continually diminiſhes and contracts till ſeven or eight years, when the cavity is quite filled up, and the black ſpot effaced. After eight years, theſe teeth ceaſing to afford any knowledge of the age, it is judged of by the tuſhes; which are four teeth adjoining to thoſe laſt mentioned; and, like the grinders, are not preceded by any other teeth. The two in the lower jaw uſually begin to ſhoot at three years and a half, and thoſe of the upper jaw at four; continuing very ſharp-pointed till ſix. At 10, the upper ſeem blunted, worn out, and long, the gum contracting itſelf as its years increaſe; the barer therefore they are, the older is the horſe. From 10 to 13 or 14 years, little can be ſeen to indicate the age; but at that time ſome hairs of the eye-brows begin to turn grey. This mark, however, is equivocal, like that drawn from the depth of the eye-pits; horſes from old ſtallions, or mares, having grey hairs in the eye-brows when they are not above nine or ten years old. In ſome horſes the teeth are of ſuch a hardneſs as not to wear; and in ſuch the black mark always ſubſiſts, being never effaced by time: but the age of theſe horſes, which are called *beguts* by the French, is eaſily known; the hollow of the tooth being filled up, and at the ſame time the tuſhes very long. It has been farther obſerved, that this is more common in mares than in horſes. The age of a horſe may be alſo known, though leſs accurately, by the bars in his mouth, which wear away as he advances in years.

When the horſe is without blemiſh, the legs and thighs are clean, the knees ſtraight, the ſkin and ſhank thin, and the back-ſinew ſtrong and well-braced. The ſinews and the bones ſhould be ſo diſtinct, as to make the legs appear thin and lathy, not full and round. The paſtern joints ſhould never be large and round; nor muſt there be any ſwelling near the coronet. The hocks ſhould be lean and dry, not puffed up with wind. With regard to the hoof, the coronet ſhould be equally thick, and the horn ſhining and greyiſh. A white horn is a ſign of a bad foot, for it will wear out in a ſhort time; and likewiſe when the horn is thin, it is liable to be ſpoiled in ſhoeing, and by travelling hard on ſtony grounds. This is beſt known when the ſhoe is taken off; for then the verge all round the ſole will appear thin, and the horſe will wince at the leaſt touch of the pincers.

A ſtrong foot has the fibres of the hoof very diſtinct running in a direct line from the coronet to the toe, like the grain of wood. In this caſe, care muſt be taken to keep the foot moiſt and pliable. The greateſt inconvenience attending a hard ſtrong foot, is its being ſubject to rifts and fiſſures, which cleave the hoof quite through ſometimes from the coronet down to the bottom.

A narrow heel is likewiſe a defect; and when it is not above two fingers in breadth, the foot is bad. A high heel cauſes a horſe to trip and ſtumble often; and the low one, with long yielding paſterns, is very apt to be worn quite away on a journey. Too large a foot in proportion to the reſt of the body, renders a horſe weak and heavy.

The head of a horſe ſhould be ſmall, and rather lean than fleſhy. The ears ſhould be ſmall, erect, thin, ſprightly, and pointed. The forehead, or brow, ſhould be neither too broad nor too flat, and ſhould have a ſtar or ſnip thereon. The noſe ſhould riſe a little, and the noſtrils ſhould be wide that he may breathe more freely. The muzzle ſhould be ſmall, and the mouth neither too deep nor too ſhallow. The jaws ſhould be thin, and not approach too near together at the throat, nor too high upwards towards the onſet, that the horſe may have ſufficient room to carry his head in an eaſy graceful poſture. The eyes ſhould be of a middle ſize, bright, lively, and full of fire. The tongue ſhould be ſmall, that it may not be too much preſſed by the bit; and it is a good ſign when his mouth is full of white froth, for it ſhews that he will not ſoon be overheated.

The neck ſhould be arched towards the middle, growing ſmaller by degrees from the breaſt and ſhoulders to the head. The hair of the main ſhould be long, ſmall, and fine; and if it be a little frizzled, ſo much the better. The ſhoulders ſhould be pretty long; the withers thin, and enlarge gradually from thence downwards; but ſo as to render his breaſt neither too narrow nor too groſs. A thick-ſhouldered horſe ſoon tires, and trips and ſtumbles every minute; eſpecially if he has a thick large neck at the ſame time. When the breaſt is ſo narrow that the fore-thighs almoſt touch, they are never good for much. A horſe of a middle ſize ſhould have the diſtance of five or ſix inches between his fore-thighs, and there ſhould be leſs diſtance between his feet than his thighs near the ſhoulders when he ſtands upright.

The body or carcaſe of a horſe ſhould be of a middling ſize in proportion to his bulk, and the back ſhould ſink a little below the withers; but the other parts ſhould be ſtraight, and no higher behind than before. He ſhould alſo be home-ribbed; but the ſhort ribs ſhould not approach too near the haunches, and then he will have room to fetch his breath. When a horſe's back is ſhort in proportion to his bulk, and yet otherwiſe well limbed, he will hold out a journey, tho' he will travel ſlow. When he is tall, at the ſame time with very long legs, he is but of little value.

The wind ſhould never be overlooked in the choice of a horſe: and it may eaſily be known by his flanks, if he is broken-winded, when he ſtands quiet in the ſtable; becauſe he always pinches them in with a very ſlow motion, and drops them ſuddenly. A thick-winded horſe fetches his breath often, and ſometimes rattles and wheezes. This may be always diſcovered when he is put to briſk exerciſes.

The temper of a horſe ſhould always be obſerved; a vicious horſe generally lays his ears cloſe to his pole, ſhews the whites of his eyes, and looks ſullen and dogged. An angry horſe may be known by his frowning looks; and he generally ſeems to ſtand in a poſture of defence. When he is very vicious, he pays no regard to the groom that feeds him: However, ſome horſes that are ticklish will lay back their ears, and yet be of a good diſpoſition. A fearful horſe is apt to ſtart, and never leaves it off till he is old and uſeleſs. A fretful horſe is very unfit for a journey; and you may diſcover his temper as ſoon as he gets out of the ſtable. A dull, heavy, ſluggiſh horſe may be eaſily known, whatever tricks are uſed to rouſe his ſpirits.

With regard to the colour of a horſe, the bright bay, and indeed all kinds of bays in general, are accounted good colours. The cheſnut horſe is generally preferable to the ſorrel, unleſs the former happens to be bald, or party-coloured, with white legs. Brown horſes have generally black manes and tails, and their joints are of a ruſty black. Thoſe of this colour that are dappled, are much handſomer than the reſt. Horſes of a ſhining black, and well-marked, without too much white, are in high eſteem for their beauty. A ſtar, or blaze, or white muzzle, or one or more feet tipped with white, are thought to be rather better than thoſe that are quite black.

Of greys, the dappled are accounted beſt; though the ſilver grey make a more beautiful appearance, and often prove good. The iron grey with white manes and tails are thought not to be ſo hardy. Greys of every kind will turn white ſooner or later; but the nutmeg grey, when the dappled parts incline to bay or cheſnut, are ſaid to be good hardy horſes. Roan horſes have a diverſity of colours mixed together; but the white is more predominant than the reſt. They are all generally hardy, and fit for the road; and ſome are exceeding good. Thoſe of a ſtrawberry colour moſt reſemble the ſorrel, and they are often marked with white on the face and legs. When the bay is blended with it, he ſeems to be tinctured with claret; and ſome of theſe prove to be very good. Dun, ſallow, and cream-coloured horſes have a liſt down their backs; and their manes and tails are black. Dun horſes are ſeldom choſen by gentlemen, and yet they may be very uſeful to the country farmer. The ſallow and cream-coloured are more eſteemed, both for beauty and uſe. Thoſe horſes that are finely ſpotted with gay colours like leopards are a great rarity, and for that reaſon are only in the hands of great men.

There is ſome difference in horſes according to the different countries where they are bred. For inſtance, in France, thoſe of Bretagne are pretty ſtrong made, and have generally black hair, or brown bay; and they have good legs and feet, with a hardy mouth, and a head ſhort and fleſhy; but in general they are pretty clumſy. The horſes of Franche Compté are ſaid to have the legs of tigers, and the belly of a hind; but they are ſhort and thick, and of a middle ſize; being much more proper for drawing than riding. The horſes of Gaſcony are not unlike thoſe of Spain; but they are not ſo handſome, nor ſo active, and therefore they are more proper to draw carriages. The Limoſin horſes are very vicious, and are good for little till they are ſix years old. Their colour is generally bay, or a bay brown. The horſes of Normandy are much like thoſe of Bretagne; and thoſe of Poitou have good bodies, legs, feet, and eyes; but they are far from being handſome.

The horſes of Germany are much better and more handſome than thoſe of the Low countries. They are of great uſe for carriages; but much more for the army, and for drawing the artillery. They have a great deal of hair, eſpecially about the legs. They are not large, but they are well ſet; and yet they have tender feet. The Hungarian horſes are excellent for the coach, as well as for riding: but they are large, though well proportioned; and they are of all colours, and in general very ſwift.

The Daniſh horſes are low, ſhort, and ſquare; but they have a fine head, and ſhort hair. The horſes of the Low countries are very fit for the coach, and they are beſt known by the name of Flanders-mares. The Poliſh horſes are like the Daniſh; only they have not ſo fine a fore-hand: their colour is generally a bright bay, and that of the outward peel of an onion; and they are fiery and vicious. The horſes of Switzerland are pretty much like thoſe of Germany; which is no wonder, ſince the Germans purchaſe a great number of them. The horſes of Piedmont are fiery, of a middle ſize, and of all ſorts of colours; their legs are good and handſome, their eyes fine, their ears ſmall, and their mouths good; but they do not carry their heads well.

The horſes of Naples and Italy are generally ill-made, and lean; and yet they are good and uſeful, for they are light and proper for racing, though not for a long courſe; they never do well in a colder climate. The Spaniſh horſes are very well made, and handſome, as well as very active and nimble; they have good eyes, handſome legs and heads, and are eaſily managed; they are alſo good for racing, if they are well kept: however, they are not ſo good in northern climates as in their own country. The Turkiſh horſes are of different ſhapes; but they are generally ſwift, though their mouths are bad. Moſt of them are white; though there are other colours; and they are large, hardy, ſtrong, and fit for the road.

The horſes of Barbary, commonly called *barbs*, have ſtrong hoofs, and are more proper for racing than any others whatever: ſome have ſaid they never grow old, becauſe they preſerve their vigour to the laſt. They are excellent ſtallions; and ſome of them are uſed as ſuch in Britain: however, the Arabian horſes are not quite ſo good as the Barbary, though ſome think they are both of the ſame kind; only thoſe that are uſed to the deſerts of Arabia are always in action. The horſes of the Gold-Coaſt of Guinea are very few in number, and in other parts of that coaſt there are none at all; for many of the negroes, when they have been firſt brought over to our American plantations, have expreſſed great admiration at the ſight of a horſe, and even been afraid to come near one.

Pennant's Brit. Zool.

The horſes of the Cape of Good Hope were originally brought from Perſia: and they are generally ſmall, and of a cheſnut colour; for thoſe that are natives of that country are all wild, and could never yet be tamed. The horſes of China are good, and more particularly thoſe in the province of Yun Nan; for they are very vigorous, though a little low. The horſes of the Eluth Tartars are good and full of fire; and their ſize is much the ſame as the Poliſh horſes: they are afraid of nothing; not even of lions and tigers: but perhaps this may be owing to uſe. In the country of the Mogul they are very numerous, and of all colours: they are generally of the middle ſize, though there are ſome as large and as handſome as thoſe in Europe. The wild horſes of Tartary differ very little from the tame; but they are ſo ſwift, that they avoid the arrows of the moſt ſkilful hunters.

The breed of horſes in Great Britain is as mixed as that of its inhabitants: the frequent introduction of foreign horſes has given us a variety, that no ſingle country can boaſt of: moſt other countries produce only one kind; while ours, by a judicious mixture of the ſeveral ſpecies, by the happy difference of our ſoils, and by our ſuperior ſkill in management, may triumph over the reſt of Europe, in having brought each quality of this noble animal to the higheſt perfection.

In the annals of Newmarket, may be found inſtances of horſes that have literally outſtripped the wind, as the celebrated M. Condamine has lately ſhewn in his remarks on thoſe of Great Britain. Childers is an amazing inſtance of rapidity; his ſpeed having been more than once exerted equal to 82½ feet in a ſecond, or near a mile in a minute: the ſame horſe has alſo run the round courſe at Newmarket, (which is about 400 yards leſs then 4 miles) in ſix minutes and 40 ſeconds; in which caſe his fleetneſs is to that of the ſwifteſt barb, as four to three; the former, according to Dr Maty's computation, covering at every bound a ſpace of ground equal in length to 23 feet royal, the latter only that of 18½ feet royal.

Horſes of this kind derive their origin from Arabia; the ſeat of the pureſt and moſt generous breed.

The ſpecies uſed in hunting, is a happy combination of the former with others ſuperior in ſtrength, but inferior in point of ſpeed and lineage: an union of both is neceſſary; for the fatigues of the chace muſt be ſupported by the ſpirit of the one, as well as by the vigour of the other.

No country can bring a parallel to the ſtrength and ſize of our horſes deſtined for the draught; or to the activity and ſtrength united of thoſe that form our cavalry.

In our capital there are inſtances of ſingle horſes that are able to draw on a plain, for a ſmall ſpace, the weight of three tuns; but could with eaſe, and for a continuance, draw half that weight. The pack-horſes of Yorkſhire, employed in conveying the manufactures of that county to the moſt remote parts of the kingdom, uſually carry a burden of 420 pounds; and that indifferently over the higheſt hills of the north, as well as the moſt level roads. But the moſt remarkable proof of the ſtrength of our Britiſh horſes, is to be drawn from that of our mill-horſes: ſome of theſe will carry at one load 13 meaſures, which at a moderate computation of 70 pounds each, will amount to 910; a weight ſuperior to that which the leſſer ſort of camels will bear: this will appear leſs ſurpriſing, as theſe horſes are by degrees accuſtomed to the weight; and the diſtance they travel no greater than to and from the adjacent hamlets.

Our cavalry, in the late campaigns, (when they had opportunity) ſhewed over thoſe of our allies, as well as of the French, a great ſuperiority both of ſtrength and activity: the enemy was broken through by the impetuous charge of our ſquadrons; while the German horſes, from their great weight and inactive make, were unable to ſecond our efforts; though thoſe troops were actuated by the nobleſt ardour.

The preſent cavalry of this iſland only ſupports its ancient glory. It was eminent in the earlieſt times: our ſcythed chariots, and the activity and good diſcipline of our horſes, even ſtruck terror into Ceſar's legions: and the Britons, as ſoon as they became civilized enough to coin, took care to repreſent on their money the animal for which they were ſo celebrated. It is now impoſſible to trace out this ſpecies; for thoſe which exiſt among the *indigenæ* of Great Britain, ſuch as the little horſes of Wales and Cornwal, the hobbies of Ireland, and the ſhelties of Scotland, though admirably well adapted to the uſes of thoſe countries, could never have been equal to the work of war: but probably we had even then a larger and ſtronger breed in the more fertile and luxuriant parts of the iſland. Thoſe we employ for that purpoſe, or for the draught, are an offſpring of the German or Flemiſh breed, meliorated by our ſoil and a judicious culture.

The Engliſh were ever attentive to an exact culture of theſe animals; and in very early times ſet a high value on their breed. The eſteem that our horſes were held in by foreigners ſo long ago as the reign of Athelſtan, may be collected from a law of that monarch, prohibiting their exportation, except they were deſigned as preſents. Theſe muſt have been the native kind, or the prohibition would have been needleſs; for our commerce was at that time too limited to receive improvement from any but the German kind, to which country their own breed could be of no value.

But when our intercourſe with the other parts of Europe was enlarged, we ſoon laid hold of the advantages this gave of improving our breed. Roger de Beleſme, earl of Shrewſbury, is the firſt that is on record: he introduced the Spaniſh ſtallions into his eſtate in Powiſland, from which that part of Wales was for many ages celebrated for a ſwift and generous race of horſes. Giraldus Cambrenſis, who lived in the reign of Henry II. takes notice of it; and Michael Drayton, cotemporary with Shakeſpear, ſings their excellence in the ſixth part of his Polyolbion. This kind was probably deſtined to mount our gallant nobility, or courteous knights for feats of chivalry, in the generous conteſts of the tilt-yard. From theſe ſprung, to ſpeak the language of the times, the flower of courſers, whoſe elegant form added charms to the rider, and whoſe activity and managed dexterity gained him the palm in that field of gallantry and romantic honour.

The increaſe of our inhabitants, and the extent of our manufactures, together with the former neglect of internal navigation to convey thoſe manufactures, multiplied the number of our horſes: an exceſs of wealth, before unknown in theſe iſlands, increaſed the luxury of carriages, and added to the neceſſity of an extraordinary culture of theſe animals: their high reputation abroad has alſo made them a branch of commerce, and proved another cauſe of their vaſt increaſe.

As no kingdom can boaſt of parallel circumſtances, ſo none can vie with us in the number of theſe noble quadrupeds. It would be extremely difficult to gueſs at the exact amount of them, or to form a periodical account of their increaſe: The number ſeems very fluctuating. William Fitz-Stephen relates, that in the reign of king Stephen, London alone poured out 20,000 horſemen in the wars of thoſe times: yet we find, that, in the beginning of queen Elizabeth's reign, the whole kingdom could not ſupply 2000 horſes to form our cavalry: and even in the year 1588, when in the moſt imminent danger from the Spaniſh invaſion, all the cavalry which the nation could then furniſh amounted only to 3000. To account for this difference we muſt imagine, that the number of horſes which took the field in Stephen's reign was no more than an undiſciplined rabble; the few that appeared ed under the banners of Elizabeth, a corps well formed, and ſuch as might be oppoſed to ſo formidable an enemy as was then expected: but ſuch is their preſent increaſe, that, in the late war, the number employed was 13,575; and ſuch is our improvement in the breed of horſes, that moſt of thoſe which are uſed in our waggons and carriages of different kinds, might be applied to the ſame purpoſe: of thoſe, our capital alone employs near 22,000.

The all-wiſe Creator hath finely limited the ſeveral ſervices of domeſtic animals towards the human race; and ordered that the parts of ſuch, which in their lives have been the moſt uſeful, ſhould after death contribute the leaſt to our benefit. The chief uſe that the *exuviæ* of the horſe can be applied to, is for collars, traces, and other parts of the harneſs; and thus, even after death, he preſerves ſome analogy with his former employ. The hair of the mane is of uſe in making wigs; of the tail, in making the bottoms of chairs, floor-cloths, and cords; and to the angler in making lines.

TECHNICAL DESCRIPTION *of the Parts of a* HORSE.

Plate CIII. fig. 1.

The Fore Part. 1. The forehead. 2. The temples. 3. Cavity above the eye. 4. The jaw. 5. The lips. 6. The noſtrils. 7. The tip of the noſe. 8. The chin. 9. The beard. 10. The neck. 11. The mane. 12. The fore-top. 13. The throat. 14. The withers. 15. The ſhoulders. 16. The cheſt. 17. The elbow. 18. The arm. 19. The plate vein. 20. The cheſnut. 21. The knee. 22. The ſhank. 23. The main tendents. 24. The fetlock joint. 25. The fetlock. 26. The paſtern. 27. The coronet. 28. The hoof. 29. The quarters. 30. The toe. 31. The heel.—*The Body.* 32. The reins. 33. The fillets. 34. The ribs. 35. The belly. 36. The flanks.—*The Hind Part.* 37. The rump. 38. The tail. 39. The buttocks. 40. The haunches. 41. The ſtifle. 42. The thighs. 43. The hock. 44. The kerb. 45. The point of the hock.

For the breeding, rearing, &c. of horſes, ſee the articles COLT, HORSE, and STALLION; for the method of training and managing them, ſee HORSEMANSHIP; and for their diſeaſes and cure, ſee FARRIERY.

Plate CIII. fig. 2.

2. The ASS is likewiſe a domeſtic animal, and eaſily diſtinguiſhed from the horſe at firſt ſight; we never confound theſe two animals, even though they ſhould happen to be of the ſame colour and ſtature. However, when we view the different parts of the aſs, whether the external or internal, and compare them with the correſponding parts of the horſe, the reſemblance of theſe parts is ſo perfect, that we are ſurpriſed to find the individuals ſo different and ſo eaſily diſtinguiſhable by the eye. From this circumſtance, ſome naturaliſts have conſidered the aſs and the horſe to be of the ſame ſpecies of animals; and that the ſmall differences between them are accidental, or owing to the influence of climate, culture, &c. Linnæus's ſpecific mark of the horſe is, that the whole tail is covered with long hair; and his ſpecific mark of the aſs is, that the tail has long hair only towards the point, and a black-croſs over the ſhoulders. On the other hand, when we conſider the differences in the temper, the manners and diſpoſitions of theſe two animals, and, above all, the impoſſibility of mixing them ſo as to produce a common or intermediate ſpecies capable of propagating and tranſmitting in the ſame manner as other diſtinct ſpecies, the notion that the horſe and the aſs are the ſame ſpecies will appear to be without any ſolid foundation. Beſides, the aſs differs materially from the horſe in the thickneſs of the head, the length of the ears, the hardneſs of the ſkin, and in the voice, the diſpoſitions, the manner of drinking, &c. With regard to animals, there is perhaps but one permanent and uniform ſpecific diſtinction in nature: A male and female of different ſpecies may copulate, may produce a third animal reſembling both, but very different from either: but here nature has put a final ſtop to all further procreation; the third animal, although it be ſeemingly furniſhed with every thing neceſſary for propagating, remains for ever barren. Now, the horſe may be made to copulate with the aſs; a mule, or mixture of the two, is the fruit of the unnatural embrace: but the impregnation of a mule is found by experience to be altogether impoſſible.

The aſs, therefore, is a diſtinct ſpecies, and his race as ancient as that of the horſe. Why, then, ſhould this uſeful, patient, ſober animal be ſo much deſpiſed? We are apt to compare him, on every occaſion, with the horſe, and from this compariſon are led to very falſe and unfavourable concluſions. The horſe is educated with great care and expence; while the poor aſs, abandoned to the abuſe of the meaneſt ſervants or the cruelty of children, inſtead of deriving benefit from inſtruction, loſes in effect his natural good qualities by the bad treatment he ſuffers. He is the ſport and buffet-block of every ruſtic, who beat and overload him without mercy or diſcretion. They never conſider that the aſs would be the moſt uſeful, the beſt made, and moſt diſtinguiſhed of all animals, if there were no horſes in the world.

The aſs is as humble, patient, and tranquil, as the horſe is bold, ardent, and impetuous. He ſubmits with firmneſs, perhaps with magnanimity, to ſtrokes and chaſtiſement; he is temperate both as to the quantity and quality of his food; he contents himſelf with the rigid and diſagreeable herbage which the horſe and other animals leave to him, and diſdain to eat: he is more delicate with regard to his drink, never uſing water unleſs it be perfectly pure. As his maſter does not take the trouble of combing him, he often rolls himſelf on the turf among thiſtles, ferns, &c. Without regarding what he is carrying, he lies down to roll as often as he can, ſeeming to reproach his maſter for neglect and want of attention.

When very young, the aſs is a gay, ſprightly, nimble, and gentle animal. But he ſoon loſes theſe qualities, probably by the bad uſage he meets with; and becomes lazy, untractable, and ſtubborn. When under the influence of love, he becomes perfectly furious. The affection of the female for her young is ſtrong: Pliny aſſures us, that when an experiment was made to diſcover the ſtrength of maternal affection in a ſhe-aſs, ſhe run thro' the flames in order to come at her colt.

Although the aſs be generally ill uſed, he diſcovers a great attachment to his maſter; he ſmells him at a diſtance, ſearches the places and roads he uſed to frequent, and eaſily diſtinguiſhes him from the reſt of mankind. The aſs has a very fine eye, an excellent ſcent, and a good ear. When overloaded, he hangs his head, and ſinks his ears: when too much teazed or tormented, he opens his mouth and retracts his lips in a diſagreeable manner, which gives him an air of ridicule and deriſion. If you cover his eyes, he will not move another ſtep; if you lay him on his ſide, and place his head ſo that one eye reſts on the ground, and cover the other with a cloth, he will remain in this ſituation without making any attempt to get up. He walks, trots, and gallops in the ſame manner as the horſe; but all his motions are ſlower. Whatever be the pace he is going at, if you puſh him, he inſtantly ſtops.

The cry of the horſe is known by the name of *neighing;* that of the aſs, by *braying*, which is a long, diſagreeable noiſe, conſiſting of alternate diſcords from ſharp to grave and from grave to ſharp; he ſeldom cries but when preſſed with hunger or love: the voice of the female is clearer and more piercing than that of the male.

The aſs is leſs ſubject to vermin than other animals covered with hair; he is never troubled with lice, probably owing to the hardneſs and dryneſs of his ſkin; and it is probably for the ſame reaſon, that he is leſs ſenſible to the whip and ſpur than the horſe.

The teeth of the aſs fall out and grow at the ſame age and in the ſame manner as thoſe of the horſe; and he has nearly the ſame marks in his mouth.

Aſſes are capable of propagating when two years old. The females are in ſeaſon during the months of May and June. The milk appears in the dugs ten months after impregnation; ſhe brings forth in the twelfth month, and always one at a time. Seven days after the birth, the ſeaſon of the female returns, and ſhe is again in a condition to receive the male. The colt ſhould be taken from her at the end of five or ſix months, that the growth and nouriſhment of the fetus may not be obſtructed. The ſtallion or jack aſs ſhould be the largeſt and ſtrongeſt that can be found; he ſhould be at leaſt three years old, and never ought to exceed ten.

The aſs, like the horſe, takes three or four years in growing, and lives till he be 25 or 30: he ſleeps leſs than the horſe, and never lies down to ſleep but when exceſſively fatigued. He is more robuſt, and leſs ſubject to diſeaſes, than the horſe.

Travellers inform us that there are two ſorts of aſſes in Perſia; one of which is uſed for burdens, they being ſlow and heavy: the other is kept like horſes for the ſaddle; for they have ſmooth hair, carry their head well, and are much quicker in their motion; but when they ride them, they ſit nearer their buttocks than when on a horſe: they are dreſſed like horſes, and are taught to amble like them; but they generally cleave their noſtrils to give them more room for breathing. Dr Ruſſel likewiſe tells us they have two ſorts in Syria; one of which is like ours, and the other very large, with remarkably long ears; but they are both put to the ſame uſe, which is, to carry burdens.

3. The ONAGER, or wild aſs, has, by ſome authors, been confounded with the zebra; but very improperly, for this laſt is a diſtinct ſpecies; for the onager is not ſtreaked like this, nor is his ſhape ſo beautiful. Wild-aſſes are ſaid to be very ſwift of courſe; and when they ſee a man, they make a bound, and immediately fly away; inſomuch, that there is no taking of them, but by traps and gins. They have much the ſame ſhape as common aſſes; but they are of a brighter colour, and there runs a white liſt from the head to the tail. Of the hide of theſe aſſes, and particularly of that part next the rump, they make that excellent leather which we call *ſhagreen*, and which is put to ſo many curious uſes.

In America there were originally no aſſes at all, nor yet horſes: but they were carried thither long ago, at firſt by the Spaniards, and afterwards by other nations, where they have multiplied greatly; inſomuch, that, in ſome places, there are whole droves of them that run wild, and are very hard to be caught. Aſſes in general carry the heavieſt burdens in proportion to their bulk; and, as their keeping coſts little or nothing, it is a great wonder that they are not put to more uſes than they generally are among us.

The fleſh of the common aſs is never eaten in theſe parts of the world; though ſome pretend their colts are tender, and not diſagreeable.

Plate CIII. fig. 3.

3. The ZEBRA.—This animal has the figure and gracefulneſs of the horſe, joined to the ſwiftneſs of the ſtag. He is about 7 feet long, from the point of the muzzle to the origin of the tail, and about 4 feet high. The colour of his ſkin is beautiful and uniform, conſiſting of alternate parallel rings of black and white, diſpoſed in the moſt regular manner, as repreſented in the plate. He is generally leſs than the horſe, and larger than the aſs.

The zebra is found no where but in the eaſtern and ſouthern provinces of Africa, from Ethiopia to the Cape of Good Hope, and from the Cape of Good Hope to Congo. The Dutch have been at great pains to tame and uſe them for domeſtic purpoſes, but with little ſucceſs. He is hard-mouthed, and kicks when any perſon attempts to touch or come near him. He is reſtleſs and obſtinate as a mule: but perhaps the wild horſe is naturally as untractable as the zebra; for, it is probable, if he were early accuſtomed to obedience and a domeſtic life, he would become as docile as the horſe.

ERA, in chronology. See ÆRA.

ERANARCHA, a public officer among the ancient Greeks, whoſe buſineſs was to preſide over and direct the alms and proviſions made for the poor. Cornelius Nepos, in his life of Epaminondas, deſcribes his office thus: When any perſon was reduced to poverty, taken captive, or had a daughter to marry, which he could not effect for want of money, &c. the eranarcha called an aſſembly of friends and neighbours, and taxed each according to his means and eſtate, to contribute towards his relief.

ERASMUS (Deſiderius), born at Rotterdam, 1467. He loſt his father and mother at 14 years of age; and was committed to the care of certain guardians, who would force him to be an eccleſiaſtic, which he refuſed for a long time. However, he was obliged to aſſume the religious habit among the canons regular in the monaſtery of Stein near Tergou; but afterwards obtained a diſpenſation from his vows. He was the moſt learned man of the age in which he lived; and contributed, by his example and his writings, to the reſtoration of learning in the ſeveral countries in which he occaſionally reſided, viz. Italy, Switzerland, Holland, France, and England: with the laſt, he was moſt ſatiſfied; and found the greateſt encouragement from Henry VIII. Sir Thomas More, and all the learned Engliſhmen of thoſe days. He publiſhed a great many books;

Plate CIII.

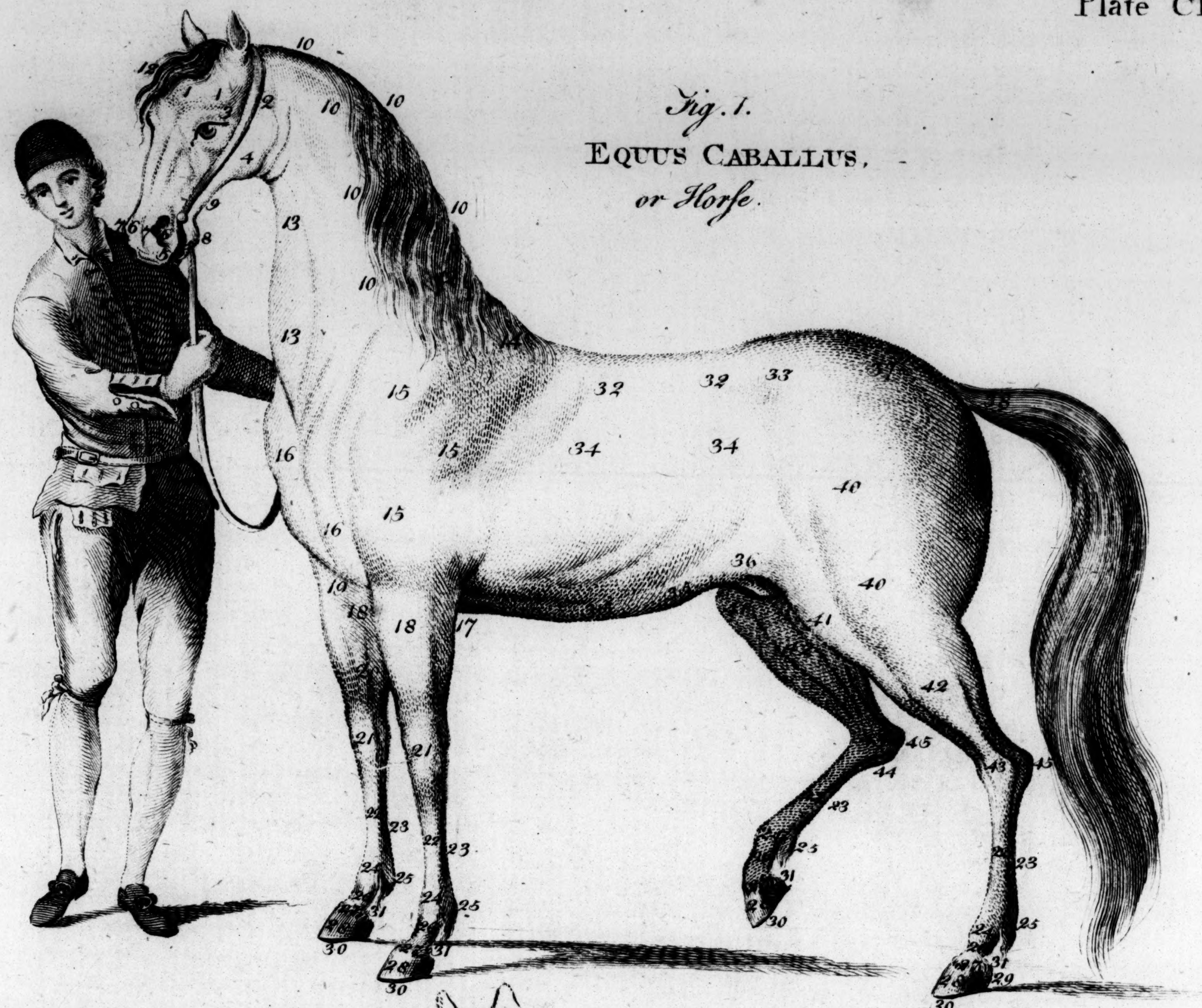
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Fig. 1. **Equus Caballus,** *or Horſe.*

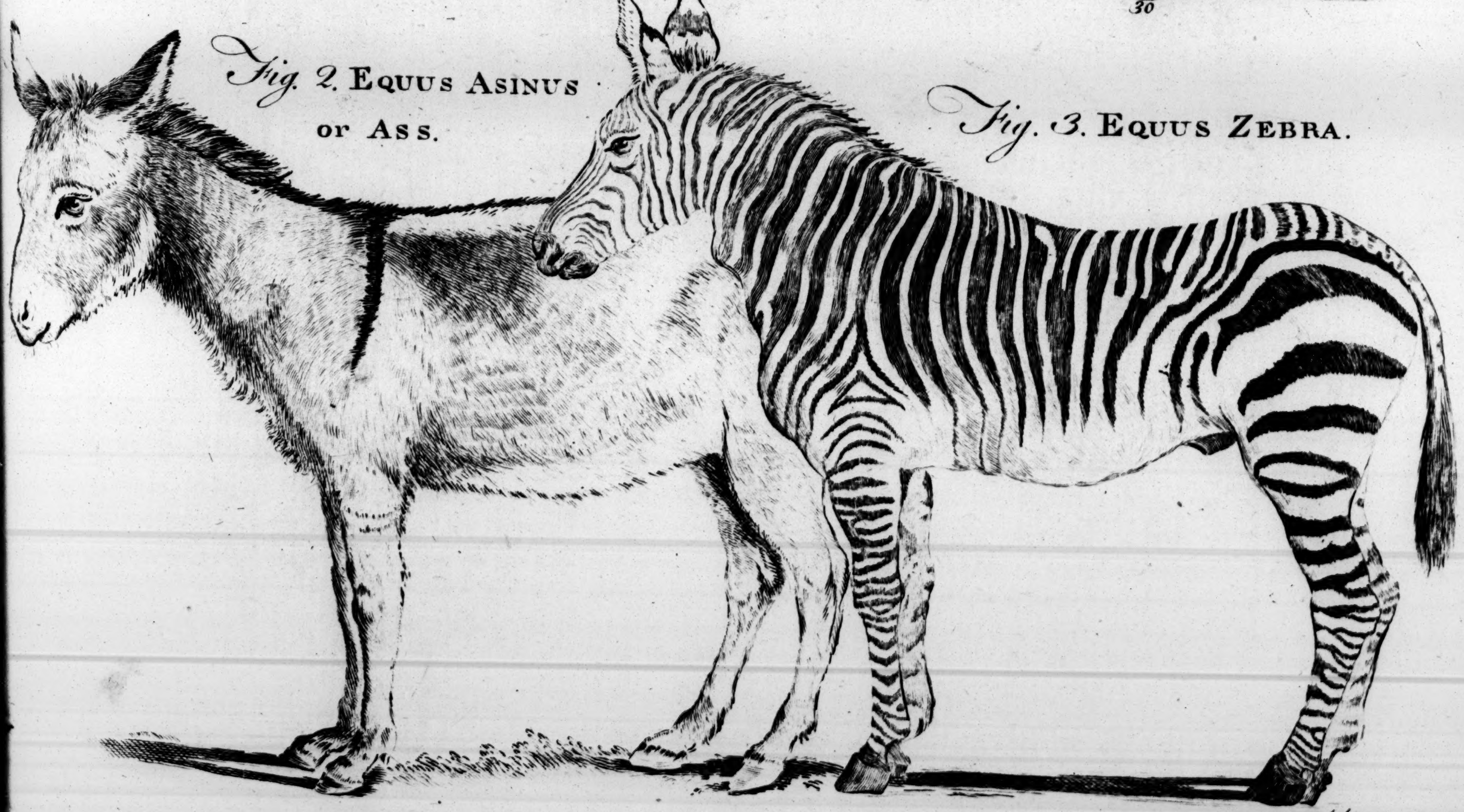

Fig. 2. **Equus Asinus or Ass.**

Fig. 3. **Equus Zebra.**

A. Bell Sculpt.

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books; and died at Baſil in 1536. He was buried honourably, and his memory is ſtill had in veneration. He had, however, many enemies; and as he did not embrace the reformation, and yet cenſured many things in Popery, he hath been treated injuriouſly both by Catholics and Proteſtants. The works of Eraſmus in 10 vols folio were publiſhed at Leyden in 1706, in a very handſome manner, under the care of M. Le Clerc. Dr Jortin publiſhed his life in one vol. 4to, 1758.

ERATO, in fabulous hiſtory, one of the muſes. She preſided over elegiac or amorous poetry, and dancing; and is repreſented as a young maiden crowned with myrtle and roſes, having a lyre in her right-hand, and a bow in her left; with a little winged Cupid placed by her, armed with his bow and arrows.

ERATOSTHENES, a Cyrenæan philoſopher, hiſtorian, and poet; called for his learning, *Plato Minor*. He was keeper of the famous library at Alexandria; and was greatly in favour with Ptolemy Euergetes, by whoſe order he wrote a hiſtory of the Theban kings of Egypt, which ſucceſſion was entirely omitted by Manetho. He thus fixed the Egyptian chronology, and his authority is by many preferred to that of Manetho. He wrote many other things, a catalogue of which is to be ſeen in Fabricius, Voſſius, &c. but his only piece now remaining entire is a deſcription and fabulous account of the ſtars. He ſtarved himſelf in old age through grief for the dimneſs of his ſight, about the 10th or 12th year of Ptolemy Epiphanes, 194 B. C.

EREBUS, called by the poets the *god of hell*, born of Chaos and Tenebræ. It is likewiſe the name of an infernal river.

ERECTION, in a general ſenſe, the art of raiſing or elevating any thing; as the erection of a perpendicular, &c. It is alſo uſed in a figurative ſenſe; as the erection of a biſhopric, marquiſate, &c.

Erection is particularly uſed by medical writers, for the ſtate of the penis when ſwelled and diſtended by the action of the muſcles called *erectores*. See Anatomy, n° 371, u, y.

There is alſo an erection of the clitoris, which is performed by muſcles for that purpoſe. *Ibid.* n° 372, c.

EREMITA, in zoology; a ſpecies of Scarabæus.

ERFORT, a town of Germany, in the circle of Upper Saxony, the capital of Thuringia, and ſubject to the elector of Mentz. It is defended by good ramparts; and has a caſtle on an eminence, which commands the town. Its inhabitants are almoſt all Lutherans, but its principal churches belong to the Catholics. There are ſeveral handſome ſtructures, both public and private; but the houſes in general are but indifferently built. E. Long. 11. 14. N. Lat. 50. 49.

ERGOT, in farriery, is a ſtub, like a piece of ſoft horn, about the bigneſs of a cheſnut, placed behind and below the paſtern-joint, and commonly hid under the tuft of the fetlock.

ERICA, heath; a genus of the monogynia order, belonging to the octandria claſs of plants. Of this there are four ſpecies, natives of Britain; which are ſo well known, that no deſcription needs be given of them. In the Highlands of Scotland this plant is made ſubſervient to a great variety of purpoſes. The poorer inhabitants make walls for their cottages with alternate layers of heath and a kind of mortar made of black earth and ſtraw. The woody roots of the heath are placed in the centre; the tops externally and internally. They make their beds of it, by placing the roots downwards; and the tops only being uppermoſt, they are ſufficiently ſoft to ſleep upon. Cabbins are alſo thatched with it. In the iſland of Ilay, ale is frequently made by brewing one part of malt and two of the tops of young heath; ſometimes adding hops. Boethius relates, that this liquor was much uſed by the Picts.—Woolen cloth boiled in alum water, and afterwards in a ſtrong decoction of heath-tops, comes out of a fine orange colour. The ſtalks and tops will tan leather. Beſoms and faggots to burn in ovens are alſo made of this plant. It is alſo uſed for filling up drains that are to be covered over. Sheep and goats will ſometimes eat the tender ſhoots, but they are not fond of them. Cattle not accuſtomed to feed on heath, give bloody milk; but they are ſoon relieved by drinking plentifully of water. Horſes will eat the tops. Bees extract a great deal of honey from the flowers; and, where heath abounds, the honey has a reddiſh caſt.

ERIDANUS, in aſtronomy. See Astronomy, n° 206.

ERIE, a vaſt lake to the weſtward of Penſilvania, in North America, ſituated between 80° and 87° W. Long. and between 41° and 42° N. Lat.

ERIGENA, or Scotus, (John), a famous ſcholaſtic divine, born about the beginning of the ninth century; but where, is a matter of diſpute among authors. Bale and Pits ſay he was born at St David's in Wales; Dempſter, Mackenzie, and Henry, that he was born at Ayr in Scotland; which they infer from his names *Erigina* and *Scotus*, by the latter of which he was generally diſtinguiſhed by his cotempornry writers. But Du Pin and Sir James Ware aſſert that he was by birth an Iriſhman; Ireland being in thoſe days called *Scotia*, and by the natives *Erin*. They agree, however, in relating that he travelled to Athens, where he acquired a competent knowledge of the Greek and other oriental languages; and that he afterwards reſided many years in the court of Charles the Bald, king of France, who, on account of his ſingular abilities, treated him as his intimate friend and companion. He ſlept frequently in the royal apartment; and was conſtantly admitted to the king's table. "We may judge (ſays a modern hiſtorian) of the freedom which he uſed with Charles, by the following repartee. As the king and Scotus were ſitting one day at table, oppoſite to each other, after dinner, drinking a cheerful glaſs, the philoſopher having ſaid ſomething that was not quite agreeable to the rules of French politeneſs, the king in a merry humour aſked him, Pray what is between a *Scot* and a *ſot*? To which he anſwered, Nothing but the table." See *Henry's Hiſtory of Great Britain*, vol. I. p. 344. who quotes this ſtory from *Hovedeni Annal. ad an.* 86. Quer. What language were they talking when this *bon mot* was uttered?

During his reſidence with Charles, he wrote ſeveral books of ſcholaſtic divinity; which, though abſurd enough, were at that time not ſufficiently ſo to ſecure him from the imputation of heterodoxy; and on that account the pope commanded Charles the Bald to ſend him to Rome; but the king had too great a regard for his companion to truſt him with his holineſs. One of the chief controverſies in which Scotus was engaged, and with which the pope was much offended, was concerning the real preſence and blood of Chriſt in the wafer. His opinion of this weighty matter is expreſſed in theſe few words: "What we receive corporally is not the body of our Lord; but that which feeds the ſoul, and is only perceived by faith." He was alſo engaged in two other controverſies of equal importance, but of a ſomewhat leſs delicate nature. The firſt was, Whether any part of the euchariſt be evacuated by ſtool? and the ſecond, Whether Chriſt was born of the Virgin Mary *aperta vulva?* Paſchaſius was of opinion, that this could not be without ſome injury to her perpetual virginity; and therefore believed that Chriſt came into the world *per vulvam clauſam*, as he came into the place where his diſciples were aſſembled, through the door and not through the wall, without opening the door. Concerning the firſt of theſe delicate queſtions, Scotus with ſeveral others declared, that part of the euchariſt was certainly evacuated by ſtool; for which they were honoured with the appellation of *Stercoriſts*. And as to the ſecond queſtion, he ſaid, that the *vulva clauſa* was a dangerous opinion: for it would thence follow, that he was not born, but iſſued; *non eſt naſci, ſed erumpi.* See Mackenzie, vol. I. p. 55.

Whether this John Scotus returned to England, or ended his days in France, is a matter of doubt. Some of our hiſtorians tell us, that he left France in the year 864; and that, after reſiding about three years in Oxford, he retired to the abbey of Malmſbury, where his ſcholars ſtabbed him with their pen-knives. There is no foundation for this ſtory. Probably he died about the year 874; but whether in France or England, is uncertain, and of little importance. Some have related, that he was invited to England by king Alfred: but in this they confound him with John, abbot of Etheling, who was aſſaſſinated in 895; and to this miſtake the various accounts concerning this author are to be attributed. Regardleſs of his hiſtory, he appears from his writings to have been a man of parts, and, in point of learning, ſuperior to any of his cotemporaries. He wrote, 1. *De diviſione naturæ*, lib. v. 2. *De predeſtinatione Dei.* 3. *Excerpta de differentiis & ſocietatibus Græci Latinique verbi.* 4. *De corpore et ſanguine Domini.* 5. *Ambigua S. Maximi ſeu, ſcholia ejus in difficiles locos S. Gregorii Nazianzeni, Latine verſa.* 6. *Opera S. Dionyſii quatuor in Latinam ling. converſa.* All publiſhed. 7. *De viſione Dei*, and ſeveral other works, in manuſcript, preſerved in different libraries.

ERIGERON, FLEA-BANE; a genus of the polygamia ſuperflua order, belonging to the ſyngeneſia claſs of plants. There are five ſpecies; of which the moſt remarkable is the viſcoſum, or male flea-bane of Theophraſtus, and greater flea-bane of Dioſcorides. It is a native of the ſouth of France and Italy; and hath a perennial root, from whence ariſe many upright ſtalks near three feet high. The leaves in warm weather ſweat out a clammy juice; the flowers are produced ſingle upon pretty long footſtalks, are of a yellow colour, and have an agreeable odour. The plants are eaſily propagated by ſeeds; and thrive beſt in a dry ſoil, and ſunny expoſure.

ERIGONE, in fabulous hiſtory, daughter to Icarius, died of grief for her father's death, was tranſlated into heaven, and makes the ſign Virgo.

ERINACEUS, or HEDGE-HOG, in zoology; a genus of quadrupeds belonging to the order of feræ, the characters of which are theſe: They have two foreteeth in the upper jaw, at a conſiderable diſtance from one another, and two in the under jaw, leſs diſtant; and they have two recumbent dog-teeth, one on each ſide. There are three ſpecies, viz. 1. the europæus, or common hedge-hog, with round ears, and creſted noſtrils. It is about nine inches long; the upper part of the body is totally covered with ſharp prickles, and the under part is covered with hair. The hedge-hog, even when ſtanding on his legs, has a very ugly aſpect. His body is an oblong maſs, convex above, terminated on the fore-part by a very ſharp muzzle, and mounted on four ſhort legs, of which nothing appears but the feet, and the tail is not diſcernible. His ears are broad, round, and ſhort; and his eyes are ſmall and protuberant. The length of his body, from the point of the muzzle to the anus, is about nine inches.

The hedge-hog has a very uncommon method of defending himſelf from the attacks of other animals: being poſſeſſed of little ſtrength or agility, he does not attempt to fly from or aſſail his enemies; but erects his briſtles, and rolls himſelf up like a ball, expoſing no part of his body that is not furniſhed with ſharp weapons of defence; he will not unfold himſelf, unleſs thrown into water: the more he is frightened or haraſſed, the cloſer he ſhuts himſelf up; and frequently diſcharges his urine, which has a very fetid and lothſome ſmell. While in this ſtate, moſt dogs, inſtead of biting him, ſtand off and bark, not daring to ſeize him; or, if they attempt it once, their mouths are ſo prickled with his briſtles, that they cannot be prevailed upon to attempt it a ſecond time. Both the male and female are covered with briſtles from the head to the tail. Theſe briſtles are of great uſe in defending them from other animals; but muſt be very inconvenient when they incline to copulate. This operation they cannot perform in the manner of other quadrupeds; but do it face to face, either ſtanding on end, or the female lying on her back. The females come in ſeaſon in the ſpring, and bring forth their young in the beginning of ſummer. They commonly bring forth three or four, and ſometimes five, at a time. The young ones are of a whitiſh colour, and only the points of the briſtles appear above the ſkin. It is impoſſible to tame them: the mother and her young have frequently been confined together, and furniſhed with plenty of proviſions; but, inſtead of nouriſhing them, ſhe uniformly devoured them one after another. Males and females have likewiſe been kept in one apartment, where they lived, but never copulated. Hedge-hogs feed upon fallen fruits, ſome roots, and inſects: they are very fond of fleſh-meat, whether raw or roaſted. They frequent woods, and live under the trunks of old trees, in the chinks of rocks, or under large ſtones. Naturaliſts allege, that they go into gardens, mount the trees, and come down with pears, apples, or plumbs, ſtuck upon their briſtles. But this is a miſtake: although kept in a garden, they never attempt to climb trees, or ſtick even fallen fruit upon their briſtles, but lay hold of their food with their mouth. They never come out of their holes in the day, but go about in queſt of food during the night. They eat but little, and can live very long without taking any nouriſhment. They do not lay up any ſtore of proviſions in harveſt; ſuch an inſtinct would be uſeleſs, as they ſleep all the winter. They lie under the undeſerved reproach of ſucking cattle and hurting their udders; but the ſmallneſs of their mouth renders that impoſſible.

2. The inauris, or white hedge-hog, has no external ears. It is a native of America. 3. The malaccenſis has hanging ears, and is a native of Aſia.

ERINGO, in botany. See ERYNGIUM.

ERINUS, in botany, a genus of the angioſpermia order, belonging to the didynamia claſs of plants. There are ſix ſpecies, none of them natives of Britain. They grow from two inches to four feet in height, and are adorned with flowers of a white or purple colour. They are propagated by ſeeds, but in this country generally require to be kept in a ſtove.

ERIVAN, a city of Perſia, in Aſia, and capital of Perſian Armenia. It is a large, dirty, ill-looking place, in which are no handſome buildings, the houſes being very mean, and raiſed with earth or mud; but it is full of gardens or vineyards. It is ſituated in a plain which is ſurrounded on all ſides with mountains. Two rivers paſs near it, the Zengui to the north-weſt, and the Queur Boulac to the ſouth-weſt. The fortreſs may paſs for a town of itſelf; it is of an oval form, and is four miles in circumference, containing about 800 houſes. It is inhabited by none but the native Perſians. The Armenians have ſhops in it, where they work and trade in the day-time, but at night return to their habitations in the city. The fortreſs is ſurrounded with three walls, made with bricks dried in the ſun, which have battlements, and are flanked with towers, and defended with ramparts. On the north-eaſt there is a dreadful precipice, above 200 yards in depth, at the bottom of which the river runs. The garriſon uſually conſiſted of 2000 men; but how many there are ſince the revolution, is hard to ſay. The palace of the governor of the province is within the fortreſs. The city is about a cannon's ſhot diſtant from the fortreſs, and the ſpace between is full of houſes and markets. E. Long. 44. 50. N. Lat. 40. 20.

ERMIN, in zoology. See MUSTELA.

ERMIN, in heraldry. This word alone ſignifies black ſpots on a white field; but if the word *plain* ſhould be uſed with it, it denotes nothing but white furs.

ERMIN, or *Ears of corn;* an order of knights in France, inſtituted by Francis the laſt of that name, duke of Britanny.

This order was ſo called on account that the collar of it was made up of ears of corn, lying athwart one another in ſaltier, bound together, both above and below, each ear being croſſed twice, the whole of gold. To this collar there hung a little white beaſt, called an *ermin*, running over a bank of graſs diverſified with flowers.

ERMINES, in heraldry, the reverſe of ermine, i. e. white ſpots on a black field.

ERMINITES, in heraldry, ſhould ſignify little ermines, but it is otherwiſe; for it ſignifies a white field powdered with black, only that every ſuch ſpot hath a little red hair on each.—Erminites alſo ſignify a yellow field powdered with black, which the French expreſs much better by *or ſemée d' ermine de ſable.*

ERMINOIS, in heraldry, ſignifies the field or, and the ſpots black.

EROSION, among phyſicians, denotes much the ſame with CORROSION, only in a ſtronger degree.

EROTESIS. See ORATORY, n° 94.

EROTIC, in general, any thing relating to the paſſion love.

ERPENIUS (Thomas), in Dutch THOMAS of ERPE; a celebrated profeſſor of the Arabic language, was born at Gorcum in Holland, in 1584; and educated at Leyden. He applied himſelf to the oriental languages at the perſuaſion of Joſeph Scaliger; and afwards travelled into England, France, Italy and Germany, and every where obtained the eſteem of the the learned. On his return to Holland, he was made profeſſor of Arabic in the univerſity of Leyden, and died there in 1624. He publiſhed a great many excellent works, which ſpread his reputation through the whole learned world. It is ſaid, that the king of Morocco admired ſo greatly the letters Erpenius wrote to him in Arabic in the name of the United Provinces, that he could not ceaſe reading them, and ſhowing them to thoſe who ſpoke that language naturally.

ERRATIC, in general, ſomething that wanders, or is not regular: hence it is the planets are called *erratic ſtars.*

ERRHINES, in pharmacy, medicines which when ſnuffed up the noſe promote a diſcharge of mucus from that part.

Among the milder kinds of the errhines we may reckon marjoram, baſilicon, thyme, hyſſop, ſavory, marum ſyriacum, the tops of origanum, flowers of lilies of the valley, and gum benzoin, the reſin of guaiacum, fine raſpings of aloes wood, dry volatile ſalt of ſal ammoniac perfumed with oil of marjoram, as alſo white vitriol. On the contrary, violent errhines are euphorbium, the powder of white hellebore, and, in a milder degree, ſeveral ſorts of ſnuffs, precipitate mercury, and pepper.

Errhines are more friendly to the conſtitution and nerves than ſternutatories, by their ſubtile, acrid, and volatile ſalt gently ſtimulating the pituitary membrane, and drawing the mucid humour from it. They are alſo much ſafer than ſternutatories, in their effects.

Errhines prepared of cephalic herbs are of ſingular ſervice in oppreſſive pains of the head, a hermicrania, lethargic diſorders, weakneſſes of memory, ſtuffings of the head, and coryza, mucous defluxions of the eyes, drowſineſs, vertigoes, and in caſes where the malignant humours generated by the lues venerea are lodged in the membranes of the noſtrils.

ERROUR, ERROR, in philoſophy, a miſtake of our judgment, giving aſſent to that which is not true.

Mr Locke reduces the cauſes of error to theſe four; firſt, want of proofs; ſecondly, want of ability to uſe them; thirdly, want of will to uſe them; and, fourthly, wrong meaſures of probability.

He obſerves upon the firſt of theſe cauſes of error, that the greateſt part of mankind want conveniencies and opportunities of making experiments and obſervations themſelves, or of collecting the teſtimony of others, being prevented by the neceſſity of their condition. Upon the ſecond of theſe cauſes, he obſerves, that there are many, who, from the ſtate of their condition, might beſtow time in collecting proofs, but yet are not able to carry a train of conſequences in their heads, nor weigh exactly the preponderancy of contrary proofs and teſtimonies, merely from the difference in mens underſtandings, apprehenſions, and reaſonings. Thirdly, he remarks, that though ſome have opportunities and leiſure enough, and want neither parts, learning, nor other helps, that they never come to the knowledge of ſeveral truths within their reach, either upon account of their attachment to pleaſure or buſineſs; and otherwiſe becauſe of their lazineſs or averſion to ſtudy. The fourth cauſe of error, *viz.* wrong meaſures of probability, he imputes, 1. To the practice of taking for principles propoſitions that are not in themſelves certain and evident, but, on the contrary, doubtful and falſe. 2. To received hypotheſes. 3. Predominant paſſions or inclinations. And, 4. To authority, or the giving up our aſſent to the common received opinions either of our friends or party, neighbours or country.

The cauſes of error in philoſophy, or the reaſons why all former philoſophers have through ſo many ages erred, according to Lord Bacon, are theſe following. 1. Want of time ſuited to learning. 2. The little labour beſtowed upon natural philoſophy. 3. Few entirely addicted to natural philoſophy. 4. The end of the ſciences wrong fixed. 5. A wrong way choſen. 6. The neglect of experiments. 7. Regard to antiquity and authority. 8. Admiration of the works in uſe. 9. The artifice of teachers and writers in the ſciences. 10. Oſtentatious promiſes of the moderns. 11. Want of propoſing worthy taſks. 12. Superſtition and zeal being oppoſite to natural philoſophy, as thinking philoſophy dangerous, on account of the ſchool-theology; from the opinion that deep natural inquiries ſhould ſubvert religion. 13. Schools and academies proving unfavourable to philoſophy. 14. Want of rewards. And, 15. Deſpair, and the ſuppoſition of impoſſibility.

ERROR *Loci*. Boerhaave is ſaid to have introduced this term, from the opinion that the veſſels were of different ſizes for the circulation of blood, ſerum, and lymph; and that when the larger-ſized globules were forced into the leſſer veſſels by an error of place, they were obſtructed. But this opinion does not ſeem well grounded.

ERSKINE's CENTRIFUGAL MACHINE. See CENTRIFUGAL *Machine*.

ERUCA, in general, denotes caterpillars of all kinds.

The caterpillar ſtate is that through which every butterfly muſt paſs before it arrives at its perfection and beauty: and, in the ſame manner, all the known winged animals, except only the puceron, paſs through a reptile ſtate; none of them, except this, being produced in their winged form. The change from caterpillar to butterfly was long eſteemed a ſort of metamorphoſis; a real change of one animal into another: but this is by no means the caſe. The egg of a butterfly produces a butterfly, with all the lineaments of its parent; only theſe are not diſcloſed at firſt, but for the greater part of the animal's life they are covered with a ſort of caſe or muſcular coat, in which are legs for walking, which only ſuit it in this ſtate; but its mouth takes in nouriſhment, which is conveyed to the included animal; and after a proper time this covering is thrown off, and the butterfly, which all the while might be diſcovered in it by an accurate obſerver with the help of a microſcope, appears in its proper form. Before it paſſes into this ſtate, however, there requires a ſtate of reſt for the wings to harden, and the ſeveral other parts to acquire their proper firmneſs; this is tranſacted in a time of perfect reſt, when the animal lies in what is called the *nymph* or *chryſalis ſtate*, in appearance only a lump of inanimate matter. There is a ſettled and determined time for each of theſe changes in every ſpecies; but, in the ſeveral different kinds, the periods are very different.

Some caterpillars are produced from the eggs of their parent butterfly in the ſpring, as ſoon as the trees, on whoſe leaves they are to feed, begin to bud: after a life of 13 days, they paſs into their chryſalis ſtate; and, after remaining three weeks at reſt in that, they iſſue forth with wings with all the beauty of their parents. As ſoon as they arrive at this their final ſtate, their wings are ſcarce dry before they ſeek to copulate or propagate their ſpecies: this done, the male dies; and the female only lives to depoſit her eggs, and then follows him. This is their whole buſineſs: nature never intending that they ſhould eat in this ſtate, has given them no organs for this purpoſe; ſo that they muſt neceſſarily die of hunger in a ſhort time, could they eſcape their natural death, or the great devourers of them the birds. Many ſpecies of theſe ſpring butterflies have no farther being except in the embryo included in the egg, till the ſucceeding ſpring: they lay their eggs very carefully, and in extremely nice order, round about the ſtalk of a perennial plant, or the young branch of a tree; where they remain through the heats of the ſummer and colds of the winter, and are never hatched till the ſucceeding ſpring; and, though thus expoſed, it is obſervable that the ſevereſt winters do them no harm.

Other ſpecies of theſe are ſooner hatched from the egg; and live, during the remainder of the ſummer, on the leaves of trees. After this, they paſs the whole winter in the caterpillar ſtate, uſually hiding themſelves in ſome ſheltered place, covered with webs of their own ſpinning. Theſe remain torpid all the winter; and, at the return of ſpring, leave their webs as the others do their eggs, and feed a few weeks longer; after which they paſs through the chryſalis ſtate to their perfect form. The butterfly of this ſpecies, therefore, enjoys a much longer life than the other which remains ſo long in the egg; though the ultimate duration of the animal from its excluſion from the parent, till its death, is much the ſame; ſo great a part of it being paſſed in the egg ſtate by the one, and ſo ſmall a part by the other.

Other ſpecies of theſe animals remain the whole winter in the chryſalis ſtate, and are butterflies in ſpring; and, after paſſing the middle of the ſummer in the egg, are caterpillars in the autumn. The difference of this ſtage of life is remarkably great, in proportion to the whole duration of the animal; in ſome ſpecies it does not exceed a fortnight, and in others continues 11 months.

There is no ſign of ſex in the animal while in the caterpillar ſtate: the propagation of the ſpecies is the buſineſs of the creature in its ultimate perfection; and till that, theſe parts are never excluded: one female butterfly, when ſhe has been impregnated by the male, will produce 300 or 400 eggs, or even more.

There is no way of knowing the ſexes of theſe little creatures by viewing the parts; but the whole figure and manner of the animal makes the difference. The females are always larger than the males; they are alſo more ſlow in their motions; and ſome of them have no wings, or, at the moſt, only very ſmall ones. The males, however, have a ſort of beards, more beautiful than the *antennæ* or horns of the females: the female is much ſtronger as well as bigger than the male; and not unfrequently, in caſe of danger or diſturbance, ſhe flies away with him in time of copulation.

On diſſecting the female, her uterus affords an aſtoniſhing ſight. The number of eggs in the tubes is amazing: but theſe have not all the ſame figure; and, in ſome ſpecies, as the ſilk-worm, &c. the eggs are of a beautiful blue; if any yellowiſh ones are ſeen among them, they are judged to be defective.

The care of all the butterfly tribe to lodge their eggs in ſafety is ſurpriſing. Thoſe whoſe eggs are to be hatched in a few weeks, and who are to live in the caterpillar ſtate during part of the remaining ſummer, always lay them on the leaves of ſuch plants as will afford a proper nouriſhment; but, on the contrary, thoſe whoſe eggs are to remain unhatched till the following ſpring, always lay them on the branches of trees and ſhrubs, and uſually are careful to ſelect ſuch places as are leaſt expoſed to the rigour of the enſuing ſeaſon, and frequently cover them from it in an artful manner. Some make a general coat of a hairy matter over them, taking the hairs from their own bodies for that purpoſe; others hide themſelves in hollow places in trees, and in other ſheltered cells, and there live in a kind of torpid ſtate during the whole winter, that they may depoſit their eggs in the ſucceeding ſpring, at a time when there will be no ſeverities of weather for them to combat. The day-butterflies only do this, and of theſe but a very few ſpecies; but the night ones, or *phalænæ*, all without exception, lay their eggs as ſoon as they have been in copulation with the male, and die immediately afterwards.

It is well known, that the common and natural food of theſe creatures is the leaves and verdure of vegetables; yet, as weak and harmleſs as they ſeem, they will many of them deſtroy their fellows whenever they get an opportunity. M. Reamur gives us an inſtance of this in 20 caterpillars of the oak, which he kept in a box with a ſufficient quantity of their natural food; yet their numbers daily decreaſed, till at laſt there remained only one. This is, however, only the caſe in ſome few ſpecies, the generality of theſe animals being very peaceable, many ſpecies living together in the ſame place, without moleſting one another. Theſe ſpecies, however, though freed from ſuch dangers, are expoſed to others of a much more terrible kind; the worms or maggots of ſeveral ſorts of flies are frequently found about them, ſome preying upon their outſide, others lodged within them under the ſkin, but both kinds eating the poor defenceleſs creature up alive. Thoſe which feed on the outſides are eaſily diſcovered, the others are more hid; and frequently the caterpillar, which ſeems very hearty and vigorous, and very fleſhy, ſhall be found, upon opening, to be a mere ſkin, the internal parts being found to be all eaten away, and all the food that he ſwallows ſerving only to feed a vaſt number of worms, or maggots, which crawl about at liberty within him. Theſe devouring worms are of many different ſpecies; ſome being of the gregarious, ſome of the ſolitary kinds, and ſome ſpinning webs of their own ſilk to transform themſelves in; others undergoing that change without any ſuch covering. The beautiful cabbage-caterpillar is one of thoſe unhappy kinds which frequently are infeſted with the gregarious kinds, large numbers of which ſpin themſelves webs one after another, and afterwards come out in the ſhape of the parent-fly to whoſe eggs they owed their origin.

Theſe inteſtine enemies are a ſure prevention of the butterfly's appearing at its proper time; and as many of the former naturaliſts, who knew what butterfly to expect from a peculiar ſpecies of caterpillar which they preſerved, often ſaw a parcel of flies come out in the place of it, they having no idea that the fly had laid its eggs in the fleſh of the poor creature, ſuppoſed that this was one of its natural transformations, and that certain ſpecies of caterpillars ſometimes produced butterflies, ſometimes ſmall flies.

Theſe, and many other deſtroyers, among which the birds are to be reckoned in the principal place, ſerve a noble purpoſe in preventing the too great numbers of theſe miſchievous animals. Their uſual habitation being the leaves and flowers of plants, they are, in their feeding, much expoſed to all thoſe deſtroyers: yet nature has taken care to preſerve a great number, by making many of them ſo exactly of the colour of the leaves they feed on, that they are not eaſily diſtinguiſhed from them; and by giving others a caution of keeping on the under part of the leaves and being by that means, out of ſight. But ſome ſpecies are much leſs expoſed, and of much more miſchief to the plants they feed on, by devouring more eſſential parts of them. Of theſe ſome eat the roots, and others the interior part of the trunk, deſtroying the veſſels that imbibe, and thoſe that diſtribute, the juices. Theſe are different from the common caterpillars, in that their ſkin is much leſs rough and hard; and theſe are ſecure from our obſervation, and in general from their great deſtroyers the birds. They are not, however, abſolutely ſafe from the common dangers of the other ſpecies; for there is a kind of worms that find their food and habitation even in the bodies of theſe.

The root-caterpillars, and thoſe which live within the branches of plants, are much more eaſily found out. The roots of *ſcrophularia*, and the ſtalks of lettuces, and ſome other plants, afford caterpillars which ſeem all of the ſame ſpecies. Thoſe found in the lettuces are extremely plentiful ſome years, and deſtroy vaſt quantities of that plant. Theſe uſually have their firſt habitation in the ſtalk, near the root.

Nothing more ſurpriſes us, in regard to inſects, than their induſtry; and in this the caterpillars yield to no kind, not to mention their ſilk, the ſpinning of which is one great proof of it. The ſheaths and caſes which ſome of theſe inſects build for the paſſing their transformations under, are, by ſome, made of the ſilk, with their own hair, mixed with pieces of bark, leaves, and other parts of trees, with paper, and other materials; and the ſtructure of theſe is well worthy our attention.

There are others whoſe workmanſhip, in this article, far exceeds theſe. There is one which builds in wood, and is able to give its caſe a hardneſs greater than that of the wood itſelf in its natural ſtate. This is the ſtrange horned caterpillar of the willow, which is one of thoſe that eat their *exuviæ*. This creature has extremely ſharp teeth, and with theſe it cuts the wood into a number of ſmall fragments: theſe fragments it afterwards unites together into a caſe, of what ſhape it pleaſes, by means of a peculiar ſilk; which is no other than a tough and viſcous juice, which hardens as it dries, and is a ſtrong and firm cement. The ſolidity of the caſe being thus provided for, we are to conſider, that the caterpillar incloſed in it is to become a butterfly; and the wonder is, in what manner a creature of this helpleſs kind, which has neither legs to dig nor teeth to gnaw with, is to make its way out of ſo firm and ſtrong a lodgment as this in which it is hatched. It has been ſuppoſed by ſome, that the butterfly, as ſoon as hatched, diſcharged a liquor which ſoftened the viſcous matter that holds the caſe together, and ſo its ſeveral fragments falling to pieces, the way out lies open. This is evidently the truth of the caſe; though thoſe who ſuppoſed it, did it by mere conjecture: for, on a ſtrict examination, this liquor is always to be found in the animal, and is of the moſt proper kind for ſuch a ſervice. Reaumur judged, from the effects, that this liquor muſt be of a ſingular nature, and very different from the generality of animal fluids: and in diſſecting this creature in the caterpillar ſtate, there will always be found near the mouth, and under the œſophagus, a bladder of the bigneſs of a ſmall pea, full of a limpid liquor, of a very quick and penetrating ſmell, and which, upon divers trials, proves to be a very powerful acid; and, among other properties, which it has in common with other acids, it ſenſibly ſoftens the glue of the caſe, on a common application.

It is evident that this liquor, beſides it uſe to the caterpillar, remains with it in the chryſalis ſtate, and is the very thing that gives it a power of diſſolving the ſtructure of the caſe, and making its way through in a proper manner at the neceſſary time. Dr Boerhaave has adopted the opinion, that there are no true acids in animals, except in the ſtomach, or inteſtines; but this familiar inſtance proves the error of that determination. Phil. Tranſ. abr. ix. p. 39, &c.

Another very curious and myſterious artifice, is that by which ſome ſpecies of caterpillars, when the time of their changing into the chryſalis ſtate is coming on, make themſelves lodgments in the leaves of the trees, by rolling them up in ſuch a manner as to make themſelves a ſort of hollow cylindric caſe, proportioned to the thickneſs of their body, well defended againſt the injuries of the air, and carefully ſecured for their ſtate of tranquillity.

Beſides theſe caterpillars, which in this manner roll up the leaves of plants, there are other ſpecies which only bend them once; and others which, by means of thin threads, connect many leaves together to make them a caſe. All this is a very ſurpriſing work, but all much inferior to this method of rolling.

The different ſpecies of caterpillars have different inclinations, not only in their ſpinning, and their choice of food, but even in their manners and behaviour one to another. Some never part company from the time of their being hatched to their laſt change; but live and feed together, and undergo together their laſt change into the chryſalis-ſtate. Others ſeparate one from another as ſoon as able to crawl about, and each hunts its fortune ſingle; and there are others which regularly live to a certain time of their lives in community, and then ſeparate each to ſhift for itſelf, and never to meet again in that ſtate. *Reaumur*, *Hiſt. Inſect.* vol. ii. *paſſim.*

Caterpillars are very deſtructive and pernicious in gardens, particularly thoſe of two ſpecies. The one of theſe is that which afterwards becomes the common white butterfly. This is of a yellowiſh colour, ſpotted with black; and infeſts the leaves of cabbages, cauliflowers, and the Indian creſs, of which it eats off all the tender parts, leaving only the fibres entire; ſo that whole plantions are often ſeen deſtroyed by them in autumn, eſpecially ſuch as are near large buildings, or are crowded with trees. There is no remedy againſt this evil, but the pulling the creatures off before they are ſpread from their neſts, and watching the butterflies, which are daily, in the hot weather, depoſiting their eggs on theſe plants. Theſe, however, feed principally on the outſide of the leaves of the plants, and are therefore the eaſier taken off; but the other kind lives near the centre, and therefore is with much more difficulty diſcovered. This is much larger; and the ſkin is very tough, and of a brown colour. It is called by the gardeners, a *grub*, and is extremely pernicious. The eggs which produce it are uſually depoſited in the very heart, or centre, of the plant, particularly in cabbages; and the creature, when formed, and grown to ſome ſize, eats its way through all the blades, and leaves its dung in great quantity behind it, which ſpoils the cabbage. This inſect alſo burrows under the ſurface of the ground, and makes ſad havock among young plants, by eating off their tender ſhanks, and drawing them into its holes. This miſchief is chiefly done in the night; but wherever a plant is ſeen thus deſtroyed, if the earth be ſtirred with a finger an inch deep, the creature will be certainly found, and this is the only way of deſtroying them. *Miller*.

When theſe animals attack fruit-trees, the beſt method of driving them off is to boil together a quantity of rue, wormwood, and the common tobacco, of each equal parts, in common water; to make the liquor very ſtrong, and ſprinkle it on the leaves and young branches every night and morning, during the time when the fruit is ripening. *See alſo the article* CATERPILLAR.

In Dr Hawkeſworth's Account of the Voyages to the South Sea, vol. iii. p. 520. we have the following account of a kind of ſmall green caterpillar, which the voyagers found in great numbers on the true Weſt Indian mangroves. Their bodies were thick ſet with hairs, and they were ranging on the leaves ſide by ſide like files of ſoldiers, to the number of 20 or 30 together. When they touched them, they found that the hairs on their bodies had the quality of a nettle, and gave them a much more acute, though leſs durable pain.

ERUCÆ *Aquaticæ*, *Water-Caterpillars*. It may ſeem incredible, that there is any ſuch thing as a caterpillar whoſe habitation is under water; but experience and obſervation prove, that there are ſuch, and that they feed on the water-plants as regularly as the common kinds do on thoſe at land. Theſe are not named at random like many of the aquatic animals of the larger kinds, as the ſea-wolf, the ſea-horſe, &c. which might as well be called any thing elſe as *wolves* and *horſes*; but they are properly what they are called, and do not reſpire in the manner of the fiſh-tribe, but by their ſtigmata as other caterpillars. M. Reaumur, in his obſervations, met with two ſpecies of theſe; the one upon the potamogiton or pond-weed, the other upon the lenticula or duck-meat. Theſe are both very induſtrious animals; but the firſt being much the largeſt, its operations are more eaſily diſtinguiſhed.

This, though truly an aquatic animal, ſwims but badly, and does not at all love to wet itſelf. The parent butterfly lays her egg on a leaf of the potamogiton; and as ſoon as the young caterpillar is hatched, it gnaws out a piece of the leaf, of a roundiſh ſhape. This it carries to another part of the ſame leaf, and lays it in ſuch a manner, that there may be a hollow between, in which it may lodge. It then faſtens down this piece to the larger leaf with ſilk of its own ſpinning; only leaving certain holes at which it can put out its head, and get to gnaw any of the leaves that are near. It only gets out, though the aperture be naturally ſmall, ſince a little force from its body bends up the upper leaf, and bends down the lower, both being flexile; and when the creature is out, it has a ſort of down that defends it from being wetted, and the natural elaſticity of the leaves and of the ſilk joins the aperture up again, ſo that no water can get in. The leaves of this kind of plant are alſo naturally very ſlippery, and not eaſily wetted by water. It ſoon happens that this habitation becomes too ſmall for the animal, in which caſe it makes juſt ſuch another; and after that, at times, ſeveral others; each being only made fit for it at the ſize it is then of. The changes of this creature into the chryſalis and butterfly ſtates are in the common method. The butterfly gets out of a chryſalis which was placed on the ſurface of the water; the lightneſs of the animal eaſily ſuſtains it on the water till its wings are dried, and then it leaves that element, never to return to it again.

Erucæ *Sylveſtres, Wood-caterpillars*; the name of a genus of caterpillars which do not live, after the manner of others, on leaves of trees or plants, or open to our obſervation; but under the bark, in the trunk and branches, and in the roots of trees, and ſometimes in the body of fruits.

Theſe are eaſily diſtinguiſhed from thoſe worms and maggots which are found in roots and fruits, and owe their origin to flies of another kind; but are liable to be confounded with a ſort of animals, called by M. Reaumur, *falſe* or *baſtard caterpillars*, which carry a great reſemblance in their figure to real caterpillars, but which have more legs than any of the true ones have, and are finally transformed into four-winged flies, which are not true butterflies.

The butterflies which are the parents of thoſe caterpillars that lie immured in trees or fruits, lay their eggs on the ſurface; and the young caterpillars, when hatched, eat their way in. What appears ſomething ſurpriſing, however, in this, is, that there uſually is only one caterpillar in a fruit which is large enough to afford food to a great number; and if there are ſometimes found two creatures within, one is uſually a caterpillar, the other a worm of ſome other kind. The whole occaſion of which is, that the operation of penetrating into the fruit is ſo difficult to the young animal, that it ſeldom ſucceeds in it; and tho' the butterfly depoſits many eggs on each fruit, and theſe all hatch, yet it is only here and there one on a fruit that can find the way into it.

Theſe creatures, when once lodged in their priſon, have nothing to do but to eat up the ſubſtances which incloſe them, leaving the outer hard ſhell unhurt, which ſtill ſerves as a caſe for them. This is a very frequent caſe in the grains of corns, where the farinaceous ſubſtance ſerves as aliment, and the hard outer ſkin becomes a firm hollow caſe afterwards for the animal. The farinaceous ſubſtance in this caſe uſually proves enough for the animal in its caterpillar-ſtate; but if it does not, the creature has recourſe to a very ſingular expedient: it eats again its own excrements; and finds its now ſtronger ſtomach able to ſeparate nouriſhment from that very matter which had before paſſed off from its weaker ſtomach undigeſted.

Of theſe ſpecies of caterpillars, ſome go out of their priſon in order to change into their chryſalis, and thence into their butterfly-ſtate; but the greater number remain there, and paſs through all their changes within. Theſe caterpillars, like all the other kinds, have certain fleſh-eating worms, whoſe parents are of the fly-kind, for their terrible enemies and deſtroyers; and it is not unfrequent, on opening one of theſe ſpoiled fruits, inſtead of the expected caterpillar, to find a fly juſt ready to come out: this has been produced from the chryſalis of a worm, which had before found its way into the fruit, and eat up the caterpillar, which was the original poſſeſſor of the place.

ERUDITION, denotes an extenſive acquaintance with books, eſpecially ſuch as treat of the Belles *Lettres*.

ERUPTION, in medicine, a ſudden and copious excretion of humours, as pus or blood: it ſignifies alſo the ſame with exanthema, any breaking out, as the puſtules of the plague, ſmall-pox, meaſles, &c.

Eruption *of Volcanoes*. See Ætna, Vesuvius, Volcano, &c.

ERVUM, the lentil; a genus of the decandria order, belonging to the diadelphia claſs of plants. There are ſix ſpecies; of which the moſt remarkable is the lens, or common lentil. It is cultivated in many parts of England, either as fodder for cattle, or for the ſeeds which are frequently uſed in meagre ſoups. It is an annual plant, and riſes with weak ſtalks about 18 inches high, garniſhed with winged leaves compoſed of ſeveral pairs of narrow lobes, terminated by a claſper or tendril, which faſtens to any neighbouring plant, and is thereby ſupported: the flowers come out three or four together, upon ſhort footſtalks from the ſide of the branches. They are ſmall, of a pale purple colour, and are ſucceeded by ſhort flat pods, containing two or three ſeeds which are flat, round, and a little convex in the middle. The ſeeds of this plant are moſt commonly ſown in the month of March, where the land is dry; but in moiſt ground, the beſt time is April. The uſual quantity of ſeed allowed for an acre of land is from one buſhel and a half to two buſhels. If theſe are ſown in drills, in the ſame manner as peaſe, they will ſucceed better than when ſown in broadcaſt: the drills ſhould be a foot and an half aſunder, to allow room for the Dutch hoe to clean the ground between them; for if the weeds are permitted to grow among them, they will get above the lentils and ſtarve them. There is another ſort of lentil alſo cultivated in this country under the name of *French lentil*. It is twice the ſize of the former, both in plant and ſeed; and is much better worth cultivation than the other.

ERYNGIUM, SEA-HOLLY, or *Eryngo;* a genus of the digynia order, belonging to the pentandria claſs of plants. There are nine ſpecies; moſt of which are hardy herbaceous perennials, producing erect ſtalks from one to two or three feet high; with ſimple, entire, or divided prickly leaves; and the ſtalks terminated by roundiſh aggregate heads of quinquepetalous flowers, of white, blue, or purple colours. They all flower moſtly in July, and the ſeeds ripen in September. They are propagated by ſeeds ſown in a bed or border, either in ſpring or autumn. The plants are to be removed the autumn after they come up, into thoſe places where they are deſigned to remain. The leaves of one of the ſpecies, (*viz.* the maritimum, which grows naturally on the ſea-coaſts of England and Scotland) are ſweetiſh, with a light aromatic warmth and pungency. The roots are accounted aphrodiſiac, and are ordered to be kept candied in the ſhops. The young flowering ſhoots eaten like aſparagus are very grateful and nouriſhing.

ERYSIMUM, HEDGE-MUSTARD; a genus of the ſiliquoſa order, belonging to the tetradynamia claſs of plants. There are ſix ſpecies, of which the moſt remarkable is the officinale, hedge-muſtard, or bank-creſſes. It grows naturally in Britain under walls, by the ſides of highways, and among rubbiſh. It is warm and acrid to the taſte; and when cultivated, is uſed as a vernal pot-herb. Birds are fond of the ſeeds; ſheep and goats eat the herb; cows, horſes, and ſwine refuſe it. Some medical virtues have been attributed to the leaves, but theſe appear to be without foundation.

ERYSIPELAS, in medicine, an eruption of a fiery or acrid humour, from which no part of the body is exempted, tho' it chiefly attacks the face. See (*Index* ſubjoined to) MEDICINE.

ERYTHRINA, CORAL-TREE; a genus of the decandria order, belonging to the diadelphia claſs of plants. There are four ſpecies, all of them ſhrubby flowering exotics for the ſtove, adorned chiefly with trifoliate or three-lobed leaves, and ſcarlet ſpikes of papilionaceous flowers. They are all natives of the warm parts of Africa and America; and muſt always be kept in pots, which are to remain conſtantly in ſtoves in this country. They are propagated by ſeeds, which are annually imported hither from Africa and America. They are to be ſown half an inch deep in pots of light rich earth, which are then to be plunged in the bark-bed of the ſtove; and when the plants are two inches high, they are to be ſeparated into ſmall pots, plunging them alſo in the bark-bed, giving them frequent waterings, and as they increaſe in growth ſhifting them into larger pots.

ERYTHRINUS, in ichthyology, a ſpecies of SPARUS.

ERYTHROIDES, in anatomy, the firſt of the proper tunics or coats which cover the teſticles.

ERYTHRONIUM, DOG'S-TOOTH VIOLET; a genus of the monogynia order, belonging to the hexandria claſs of plants. There is only one ſpecies, which, however, admits of ſeveral varieties in its flowers, as white, purple, pale red, dark red, crimſon, and yellow. The plants are low and herbaceous, with a purple ſtalk and hexapetalous flowers. All the varieties are hardy and durable; and may be planted in ſmall patches in borders, where they will make a good appearance. They rarely perfect their ſeeds in this country, but may be propagated by offſets. In Siberia, according to Gmelin, they dry and mix the root of this plant with their ſoups. It grows there in great abundance; and is called by the people of the country, *beſs*.

ERZERUM, or ERZERON, a city of Turky in Aſia, and capital of Armenia, or Turkomania. It is a pretty large town, five days journey from the Black Sea, and ten from the frontiers of Perſia. It ſtands in a delightful plain, at the foot of a chain of mountains, which hinder the Frat, or Euphrates, from falling into the Black Sea. A neighbouring hill ſupplies very fine ſprings, which not only water the fields, but the ſtreets of the town. Erzerum is ſurrounded with double walls, defended by pentagonal towers; but the ditches are neither deep nor well kept up. The beglerbeg, or baſhaw of the province, lives in the ſeraglio, which is very ill-built. They reckon that there are 18,000 Turks at Erzerum, 6000 Armenians, and 10,000 Greeks. The Armenians have a biſhop, and two churches; and the Greeks have alſo a biſhop, but the church is a miſerable place. The laſt are moſtly braziers, inhabiting the ſuburbs, who work the copper brought from the neighbouring mountains. They drive a great trade in copper utenſils and furs, particularly martins ſkins. Five or ſix days journey from the town there are oaks that produce plenty of gall-nuts, which are brought hither. This place is the thoroughfare and reſting place of all the merchants trading to the Indies, eſpecially when the Arabs are watching for their prey round Aleppo and Bagdad. E. Long. 40. 50. N. Lat. 29. 46.

ESCAPE, in law; a violent or privy evaſion out of ſome lawful reſtraint, without being delivered by due courſe of law. There are two ſorts of eſcapes, voluntary and negligent. Voluntary, when a man arreſts another for felony, or other crime, and afterwards lets him go freely by conſent; in which caſe, the party that permits ſuch eſcape is held guilty, committed, and muſt anſwer for it. Negligent eſcape, on the contrary, is where one is arreſted, and afterwards eſcapes againſt the will of the perſon that arreſted him, and is not purſued with freſh ſuit, and re-taken before the perſon purſuing hath loſt ſight of him. By ſtatute 8 & 9 Will. III. c. 26. the keepers of priſons conniving at eſcapes, ſhall forfeit 500*l.*; and, in civil caſes, the ſheriff is anſwerable for the debt.

ESCHAR, in ſurgery, the cruſt or ſcab occaſioned by burns or cauſtic medicines.

ESCHAROTICS, in pharmacy, medicines which produce ESCHARS.

ESCHEAT, in law, ſignifies any lands or tenements that caſually fall to a lord within his manor, by way of forfeiture, or by the death of his tenant, without any heirs general or ſpecial.

The word *eſcheat* is ſometimes uſed for the place or circuit within which the king or other lord is entitled to eſcheats; alſo for a writ to recover the ſame from the perſon in poſſeſſion after the tenant's death.

Escheat, in Scots law, is that forfeiture which is incurred upon a perſon's being denounced a rebel. See Law, Part III. N° clxvi. 12.

ESCHRAKITES, in matters of religion, a ſect of Mahometans, who believe that man's ſovereign good conſiſts in the contemplation of God. They avoid all manner of vice, and appear always in good-humour, deſpiſing the ſenſual paradiſe of Mahomet. The moſt able preachers in the royal moſques are of this ſect.

ESCLAIRCISSEMENT, a French term adopted into our language, ſignifying the explaining or clearing up of ſome difficulty or obſcurity.

ESCUAGE, in our old cuſtoms, a kind of knight-ſervice, called *ſervice of the ſhield*, by which the tenant was bound to follow his lord to the wars at his own charge. See the articles Chivalry, Feodal *Syſtem*, and Knight-*Service*.

ESCULENT, an appellation given to ſuch plants, or the roots of them, as may be eaten: ſuch are beets, carrots, artichokes, leeks, onions, parſneps, potatoes, radiſhes, ſcorzonera, &c.

ESCURIAL, a palace which takes its name from a village about 15 miles north-weſt of Madrid, the capital of Spain. It is the largeſt and moſt ſuperb ſtructure in the whole kingdom, and perhaps one of the fineſt in Europe. It was begun by Philip II. in 1557, who was 22 years in building it. He called it *St Laurence of the Eſcurial*, becauſe he had gained a battle over the French on that ſaint's day. It contains as many different buildings as are uſually met with in a city; for there is a royal palace, a church, a college, a library, cloiſters, ſhops for mechanics, lodgings for great numbers of people, fine walks, large alleys, a vaſt park, and gardens with water-works. It is built in a dry barren ſpot, ſurrounded with rugged mountains, inſomuch that every thing that grows there is owing to art. This place was choſen only for the ſake of the ſtone wherewith it is built, which is got from a mountain juſt by, and is very durable. The way from the village to the Eſcurial, is along a walk planted with four rows of elm and lime-trees, about a mile and a half in length. There is a glacis round the building, which, before the front, is ſeparated from the ſquare by walls, through which there are gates to enter the ſquare. The ſquare is paved with ſtones of different figures, diſpoſed into compartments. The ſtructure itſelf is almoſt ſquare, and is a little longer one way than the other; all the walls are conſtructed with grey ſtone, ſo well poliſhed, that it looks like marble. This noble ſtructure has 11,000 windows, 17 cloiſters, 22 courts, 800 columns, a prodigious number of chambers, halls, ſaloons, &c.

ESCUTCHEON, or Scutcheon, in heraldry, is derived from the French *eſcuſſon*, and that from the Latin *ſcutum*, and ſignifies the ſhield whereon coats of arms are repreſented.

Moſt nations of the remoteſt antiquity, were wont to have their ſhields diſtinguiſhed by certain marks painted on them; and to have ſuch on their ſhields was a token of honour, none being permitted to have them till they had performed ſome honourable action.

The eſcutcheon, as uſed at preſent, is ſquare, only rounded off at the bottom.

ESDRAS, a Jewiſh prieſt, and doctor of the law. Artaxerxes Longimanus ſent him with rich preſents for the uſe and ornament of the temple at Jeruſalem, re-built under Zerubbabel; the king alſo ordered the neighbouring governors to provide him with what conduced to the pomp of the Jewiſh religion, and to exempt the prieſts from paying taxes. He is ſuppoſed to be the collector of the Canon of Scripture; and that, by divine inſpiration, he added ſome things which happened after the deaths of the authors. It is gueſſed he wrote the Chronicles, beſides thoſe books which bear his name, the two laſt of which are exploded even by the church of Rome.

ESK, the name of ſeveral rivers both in England and Scotland, particularly of one which forms part of the boundary between the two kingdoms. It runs from north-eaſt to ſouth-weſt, and gives name to the county of Eſkdale.

ESKIMAUX. See Esquimaux.

ESOX, in ichthyology, a genus of fiſhes belonging to the order of abdominales. The body is elongated; the head is plainiſh above; the upper jaw is plain, and ſhorter than the under one, which is dotted; and the branchioſtege membrane has from ſeven to twelve rays.

The Pike.

1. The Lucius, or Pike, has a flat head: the upper jaw is broad, and ſhorter than the lower: the under jaw turns up a little at the end, and is marked with minute punctures. The teeth are very ſharp, diſpoſed only in the front of the upper jaw, but in both ſides of the lower; in the roof of the mouth, and often in the tongue. The ſlit of the mouth, or the gape, is very wide; the eyes ſmall.

The pike is common in moſt of the lakes of Europe; but the largeſt are thoſe taken in Lapland, which, according to Scheffer, are ſometimes eight feet long. They are taken there in great abundance, dried, and exported for ſale. The largeſt fiſh of this kind ſaid to be caught in England, weighed 35 pounds.

All writers who treat of this ſpecies bring inſtances of its voraciouſneſs. It hath been known to choke itſelf by attempting to ſwallow one of its own ſpecies which proved too large a morſel. Yet its jaws are very looſely connected, and have on each ſide an additional bone like the jaw of a viper, which renders them capable of greater diſtenſion when it ſwallows its prey. It does not confine itſelf to feed on fiſh and frogs; it will devour the water-rat, and draw down the young duks as they are ſwimming about. But there are inſtances of its fierceneſs ſtill more ſurpriſing, and which indeed border a little on the marvellous. Geſner relates, that a famiſhed pike in the Rhone, ſeized on the lips of a mule that was brought to water, and that the beaſt drew the fiſh out before it could diſengage itſelf; that people have been bit by theſe voracious creatures while they were waſhing their legs; and that the pike will even contend with the otter for its prey, and endeavour to force it out of its mouth.

Small fiſhes ſhew the ſame uneaſineſs and deteſtation at the preſence of this tyrant, that the little birds do at the ſight of the hawk or owl. When the pike lies dormant near the ſurface, as is frequently the caſe, the leſſer fiſhes are often obſerved to ſwim around it in vaſt numbers and in great anxiety. Pikes are often halterin broadcaſt: the drills ſhould be a foot and an half aſunder, to allow room for the Dutch hoe to clean the ground between them; for if the weeds are permitted to grow among them, they will get above the lentils and ſtarve them. There is another ſort of lentil alſo cultivated in this country under the name of *French lentil*. It is twice the ſize of the former, both in plant and ſeed; and is much better worth cultivation than the other.

ERYNGIUM, SEA-HOLLY, or *Eryngo*; a genus of the digynia order, belonging to the pentandria claſs of plants. There are nine ſpecies; moſt of which are hardy herbaceous perennials, producing erect ſtalks from one to two or three feet high; with ſimple, entire, or divided prickly leaves; and the ſtalks terminated by roundiſh aggregate heads of quinquepetalous flowers, of white, blue, or purple colours. They all flower moſtly in July, and the ſeeds ripen in September. They are propagated by ſeeds ſown in a bed or border, either in ſpring or autumn. The plants are to be removed the autumn after they come up, into thoſe places where they are deſigned to remain. The leaves of one of the ſpecies, (*viz.* the maritimum, which grows naturally on the ſea-coaſts of England and Scotland) are ſweetiſh, with a light aromatic warmth and pungency. The roots are accounted aphrodiſiac, and are ordered to be kept candied in the ſhops. The young flowering ſhoots eaten like aſparagus are very grateful and nouriſhing.

ERYSIMUM, HEDGE-MUSTARD; a genus of the ſiliquoſa order, belonging to the tetradynamia claſs of plants. There are ſix ſpecies, of which the moſt remarkable is the officinale, hedge-muſtard, or bank-creſſes. It grows naturally in Britain under walls, by the ſides of highways, and among rubbiſh. It is warm and acrid to the taſte; and when cultivated, is uſed as a vernal pot-herb. Birds are fond of the ſeeds; ſheep and goats eat the herb; cows, horſes, and ſwine refuſe it. Some medical virtues have been attributed to the leaves, but theſe appear to be without foundation.

ERYSIPELAS, in medicine, an eruption of a fiery or acrid humour, from which no part of the body is exempted, tho' it chiefly attacks the face. See (*Index* ſubjoined to) MEDICINE.

ERYTHRINA, CORAL-TREE; a genus of the decandria order, belonging to the diadelphia claſs of plants. There are four ſpecies, all of them ſhrubby flowering exotics for the ſtove, adorned chiefly with trifoliate or three-lobed leaves, and ſcarlet ſpikes of papilionaceous flowers. They are all natives of the warm parts of Africa and America; and muſt always be kept in pots, which are to remain conſtantly in ſtoves in this country. They are propagated by ſeeds, which are annually imported hither from Africa and America. They are to be ſown half an inch deep in pots of light rich earth, which are then to be plunged in the bark-bed of the ſtove; and when the plants are two inches high, they are to be ſeparated into ſmall pots, plunging them alſo in the bark-bed, giving them frequent waterings, and as they increaſe in growth ſhifting them into larger pots.

ERYTHRINUS, in ichthyology, a ſpecies of SPARUS.

ERYTHROIDES, in anatomy, the firſt of the proper tunics or coats which cover the teſticles.

ERYTHRONIUM, DOG'S-TOOTH VIOLET; a genus of the monogynia order, belonging to the hexandria claſs of plants. There is only one ſpecies, which, however, admits of ſeveral varieties in its flowers, as white, purple, pale red, dark red, crimſon, and yellow. The plants are low and herbaceous, with a purple ſtalk and hexapetalous flowers. All the varieties are hardy and durable; and may be planted in ſmall patches in borders, where they will make a good appearance. They rarely perfect their ſeeds in this country, but may be propagated by offſets. In Siberia, according to Gmelin, they dry and mix the root of this plant with their ſoups. It grows there in great abundance; and is called by the people of the country, *beſs*.

ERZERUM, or ERZERON, a city of Turky in Aſia, and capital of Armenia, or Turkomania. It is a pretty large town, five days journey from the Black Sea, and ten from the frontiers of Perſia. It ſtands in a delightful plain, at the foot of a chain of mountains, which hinder the Frat, or Euphrates, from falling into the Black Sea. A neighbouring hill ſupplies very fine ſprings, which not only water the fields, but the ſtreets of the town. Erzerum is ſurrounded with double walls, defended by pentagonal towers; but the ditches are neither deep nor well kept up. The beglerbeg, or baſhaw of the province, lives in the ſeraglio, which is very ill-built. They reckon that there are 18,000 Turks at Erzerum, 6000 Armenians, and 10,000 Greeks. The Armenians have a biſhop, and two churches; and the Greeks have alſo a biſhop, but the church is a miſerable place. The laſt are moſtly braziers, inhabiting the ſuburbs, who work the copper brought from the neighbouring mountains. They drive a great trade in copper utenſils and furs, particularly martins ſkins. Five or ſix days journey from the town there are oaks that produce plenty of gall-nuts, which are brought hither. This place is the thoroughfare and reſting place of all the merchants trading to the Indies, eſpecially when the Arabs are watching for their prey round Aleppo and Bagdad. E. Long. 40. 50. N. Lat. 29. 46.

ESCAPE, in law; a violent or privy evaſion out of ſome lawful reſtraint, without being delivered by due courſe of law. There are two ſorts of eſcapes, voluntary and negligent. Voluntary, when a man arreſts another for felony, or other crime, and afterwards lets him go freely by conſent; in which caſe, the party that permits ſuch eſcape is held guilty, committed, and muſt anſwer for it. Negligent eſcape, on the contrary, is where one is arreſted, and afterwards eſcapes againſt the will of the perſon that arreſted him, and is not purſued with freſh ſuit, and re-taken before the perſon purſuing hath loſt ſight of him. By ſtatute 8 & 9 Will. III. c. 26. the keepers of priſons conniving at eſcapes, ſhall forfeit 500*l.*; and, in civil caſes, the ſheriff is anſwerable for the debt.

ESCHAR, in ſurgery, the cruſt or ſcab occaſioned by burns or cauſtic medicines.

ESCHAROTICS, in pharmacy, medicines which produce ESCHARS.

ESCHEAT, in law, ſignifies any lands or tenements that caſually fall to a lord within his manor, by way of forfeiture, or by the death of his tenant, without any heirs general or ſpecial.

The word *eſcheat* is ſometimes uſed for the place or circuit within which the king or other lord is entitled to eſcheats; alſo for a writ to recover the ſame from the perſon in poſſeſſion after the tenant's death.

Escheat, in Scots law, is that forfeiture which is incurred upon a perſon's being denounced a rebel. See Law, Part III. N° clxvi. 12.

ESCHRAKITES, in matters of religion, a ſect of Mahometans, who believe that man's ſovereign good conſiſts in the contemplation of God. They avoid all manner of vice, and appear always in good-humour, deſpiſing the ſenſual paradiſe of Mahomet. The moſt able preachers in the royal moſques are of this ſect.

ESCLAIRCISSEMENT, a French term adopted into our language, ſignifying the explaining or clearing up of ſome difficulty or obſcurity.

ESCUAGE, in our old cuſtoms, a kind of knight-ſervice, called *ſervice of the ſhield*, by which the tenant was bound to follow his lord to the wars at his own charge. See the articles Chivalry, Feodal *Syſtem*, and Knight-*Service*.

ESCULENT, an appellation given to ſuch plants, or the roots of them, as may be eaten: ſuch are beets, carrots, artichokes, leeks, onions, parſneps, potatoes, radiſhes, ſcorzonera, &c.

ESCURIAL, a palace which takes its name from a village about 15 miles north-weſt of Madrid, the capital of Spain. It is the largeſt and moſt ſuperb ſtructure in the whole kingdom, and perhaps one of the fineſt in Europe. It was begun by Philip II. in 1557, who was 22 years in building it. He called it *St Laurence of the Eſcurial*, becauſe he had gained a battle over the French on that ſaint's day. It contains as many different buildings as are uſually met with in a city; for there is a royal palace, a church, a college, a library, cloiſters, ſhops for mechanics, lodgings for great numbers of people, fine walks, large alleys, a vaſt park, and gardens with water-works. It is built in a dry barren ſpot, ſurrounded with rugged mountains, inſomuch that every thing that grows there is owing to art. This place was choſen only for the ſake of the ſtone wherewith it is built, which is got from a mountain juſt by, and is very durable. The way from the village to the Eſcurial, is along a walk planted with four rows of elm and lime-trees, about a mile and a half in length. There is a glacis round the building, which, before the front, is ſeparated from the ſquare by walls, through which there are gates to enter the ſquare. The ſquare is paved with ſtones of different figures, diſpoſed into compartments. The ſtructure itſelf is almoſt ſquare, and is a little longer one way than the other; all the walls are conſtructed with grey ſtone, ſo well poliſhed, that it looks like marble. This noble ſtructure has 11,000 windows, 17 cloiſters, 22 courts, 800 columns, a prodigious number of chambers, halls, ſaloons, &c.

ESCUTCHEON, or Scutcheon, in heraldry, is derived from the French *eſcuſſon*, and that from the Latin *ſcutum*, and ſignifies the ſhield whereon coats of arms are repreſented.

Moſt nations of the remoteſt antiquity, were wont to have their ſhields diſtinguiſhed by certain marks painted on them; and to have ſuch on their ſhields was a token of honour, none being permitted to have them till they had performed ſome honourable action.

The eſcutcheon, as uſed at preſent, is ſquare, only rounded off at the bottom.

ESDRAS, a Jewiſh prieſt, and doctor of the law. Artaxerxes Longimanus ſent him with rich preſents for the uſe and ornament of the temple at Jeruſalem, re-built under Zerubbabel; the king alſo ordered the neighbouring governors to provide him with what conduced to the pomp of the Jewiſh religion, and to exempt the prieſts from paying taxes. He is ſuppoſed to be the collector of the Canon of Scripture; and that, by divine inſpiration, he added ſome things which happened after the deaths of the authors. It is gueſſed he wrote the Chronicles, beſides thoſe books which bear his name, the two laſt of which are exploded even by the church of Rome.

ESK, the name of ſeveral rivers both in England and Scotland, particularly of one which forms part of the boundary between the two kingdoms. It runs from north-eaſt to ſouth-weſt, and gives name to the county of Eſkdale.

ESKIMAUX. See Esquimaux.

ESOX, in ichthyology, a genus of fiſhes belonging to the order of abdominales. The body is elongated; the head is plainiſh above; the upper jaw is plain, and ſhorter than the under one, which is dotted; and the branchioſtege membrane has from ſeven to twelve rays.

The Pike.

1. The Lucius, or Pike, has a flat head: the upper jaw is broad, and ſhorter than the lower: the under jaw turns up a little at the end, and is marked with minute punctures. The teeth are very ſharp, diſpoſed only in the front of the upper jaw, but in both ſides of the lower; in the roof of the mouth, and often in the tongue. The ſlit of the mouth, or the gape, is very wide; the eyes ſmall.

The pike is common in moſt of the lakes of Europe; but the largeſt are thoſe taken in Lapland, which, according to Scheffer, are ſometimes eight feet long. They are taken there in great abundance, dried, and exported for ſale. The largeſt fiſh of this kind ſaid to be caught in England, weighed 35 pounds.

All writers who treat of this ſpecies bring inſtances of its voraciouſneſs. It hath been known to choke itſelf by attempting to ſwallow one of its own ſpecies which proved too large a morſel. Yet its jaws are very looſely connected, and have on each ſide an additional bone like the jaw of a viper, which renders them capable of greater diſtenſion when it ſwallows its prey. It does not confine itſelf to feed on fiſh and frogs; it will devour the water-rat, and draw down the young duks as they are ſwimming about. But there are inſtances of its fierceneſs ſtill more ſurpriſing, and which indeed border a little on the marvellous. Geſner relates, that a famiſhed pike in the Rhone, ſeized on the lips of a mule that was brought to water, and that the beaſt drew the fiſh out before it could diſengage itſelf; that people have been bit by theſe voracious creatures while they were waſhing their legs; and that the pike will even contend with the otter for its prey, and endeavour to force it out of its mouth.

Small fiſhes ſhew the ſame uneaſineſs and deteſtation at the preſence of this tyrant, that the little birds do at the ſight of the hawk or owl. When the pike lies dormant near the ſurface, as is frequently the caſe, the leſſer fiſhes are often obſerved to ſwim around it in vaſt numbers and in great anxiety. Pikes are often haltered in a nooſe, and taken while they thus lie aſleep, as they are often found in the ditches near the Thames, in the month of May.

The pike.

In the ſhallow water of the Lincolnſhire fens they are often taken in a manner, we believe, peculiar to that country, and to the iſland of Ceylon. The fiſherman makes uſe of what is called a *crown-net;* which is no more than a hemiſpherical baſket, open at top and bottom. He ſtands at the end of one of the little fen-boats, and frequently puts his baſket down to the bottom of the water; then poking a ſtick into it, diſcovers whether he has any booty by the ſtriking of the fiſh; and vaſt numbers of pike are taken in this manner.

The longevity of this fiſh is very remarkable, if we may credit the accounts given of it. Rzaczynſki tells us of one that was 90 years old; but Geſner relates, that, in the year 1497, a pike was taken near Hailbrun in Suabia, with a brazen ring affixed to it, on which were theſe words in Greek characters: "I am the fiſh which was firſt put into this lake by the governor of the univerſe, Frederick the Second, the 5th of October 1230:" So that the former muſt have been an infant to this Methuſalem of a fiſh.

Pikes ſpawn in March or April, according to the coldneſs or warmneſs of the weather. When they are in high ſeaſon, their colours are very fine, being green, ſpotted with bright yellow; and the gills are of a moſt vivid and full red. When out of ſeaſon, the green changes to a grey, and the yellow ſpots turn pale.

The gar.

2. The BELONE, or GAR, ſometimes grows to the length of three feet or more. The jaws are very long, ſlender, and ſharp-pointed; the under jaw extends much farther than the upper; and the edges of both are armed with numbers of ſhort and ſlender teeth: the tongue is ſmall: the eyes are large; the irides ſilvery; the noſtrils wide and round. The body is ſlender, the belly quite flat, bounded on both ſides by a rough line. The tail is much forked. The colours are extremely beautiful when the fiſh is in the water: the back is of a fine green, beneath which appears a rich changeable blue and purple: the ſides and belly are of a fine ſilvery hue. This fiſh, which is found in many places, is known by the name of the *ſea-needle*. It comes in ſhoals on our coaſts in the beginning of ſummer, and precedes the mackerel: it has a reſemblance to it in taſte; but the light green which ſtains the back bone of this fiſh gives many people a diſguſt to it.

Saury.

3. The SAURUS, or SAURY, is 11 inches in length: the noſe ſlender; the jaws produced like thoſe of the ſea-needle, but of equal length: the eyes large: the body anguilliform; but towards the tail grows ſuddenly ſmaller, and tapers to a very inconſiderable girth. The tail is much forked: the back duſky: the belly bright and ſilvery. Great numbers of theſe fiſh were thrown aſhore on the ſands of Leith near Edinburgh, after a great ſtorm in November 1768. Rondeletius deſcribes this ſpecies among the fiſh of the Mediterranean; but ſpeaks of it as a rare kind.

ESPALIERS, in gardening, are rows of trees planted about a whole garden or plantation, or in hedges, in ſuch a manner as to incloſe quarters or ſeparate parts of a garden; and are trained up regularly to a lattice of wood-work in a cloſe hedge for the defence of tender plants againſt the injuries of wind and weather. They are of admirable uſe and beauty in a kitchen-garden, ſerving not only to ſhelter the tender plants, but ſcreen them from the ſight of perſons in the walks.

The trees chiefly planted for eſpaliers, are apples, pears, and ſome plums: ſome plant apples grafted upon paradiſe-ſtocks: but, as theſe are of ſhort duration, it is better to plant thoſe grafted upon crabſtock, or upon what the gardeners call *Dutch-ſtocks;* which will both cauſe them to bear ſooner, and prevent their growing too luxuriant. The beſt kind of apple for this purpoſe, are the golden pippen, nonpareil, rennete, &c. and the beſt ſort of pear, are the jargonelle, blanquette, &c. Theſe laſt, if deſigned for a ſtrong moiſt ſoil, ſhould be grafted upon quince-ſtocks; but, if for a dry ſoil, upon free-ſtocks.

While the trees are young, it will be ſufficient to drive a few ſtakes into the ground on each ſide of them; faſtening the branches to theſe in an horizontal poſition, as they are produced. This method will do for the three firſt years; after which an eſpalier ſhould be made of aſh-poles, whereof there muſt be two ſorts, larger and ſmaller; the former to be driven upright into the ground a foot aſunder, and the latter, or ſlender poles, to be nailed acroſs theſe, at about nine inches. Some prefer to this another ſort of eſpalier, made of ſquare timber cut to any ſize: theſe are, indeed, more ſightly, but withal vaſtly more expenſive.

When the eſpalier is thus framed, the branches are to be faſtened to it with oſier-twigs; obſerving to train them in an horizontal poſition, and at equal diſtances. Fruit-trees thus managed, are preferable to any others; not only as bearing better-taſted fruit, but as taking up very little room in a garden, ſo as to be leſs hurtful to plants which grow in the quarters.

ESPLANADE, in fortification, the ſloping of the parapet of the covered-way towards the campaign.

ESPLEES, in law, the general products which lands yield, or the profit or commodity that is to be taken or made of a thing.

ESPOUSALS, in law, ſignify a contract or promiſe made between a man and a woman, to marry each other; and in caſes where marriages may be conſummated eſpouſals go before. Marriage is termed an eſpouſal *de præſenti.*

ESQUIMAUX, a people of North America inhabiting all that vaſt tract of land known by the name of *Labrador*, or *New Britain.*—They differ very conſiderably, both in aſpect and behaviour, from the other American nations; agreeing in moſt reſpects with the inhabitants of Weſt Greenland. See *New* BRITAIN, and GREENLAND.

ESQUIRE, (from the French *eſcu*, and the Latin *ſcutum*, in Greek σκυτος, which ſignify an hide, of which ſhields were anciently made, and afterwards covered; for, in the time of the Anglo-Saxons, the ſhields had a covering of leather) was originally he, who, attending a knight in time of war, did carry his ſhield; whence he was called *eſcuier* in French, and *ſcutifer*, or *armiger*, i. e. armour-bearer, in Latin. Hotoman ſays, that thoſe whom the French call *eſquires*, were a military kind of vaſſals, having *jus ſcuti*, viz. liberty to bear a ſhield, and in it the enſigns of their family, in token of their gentility or dignity. But this addition hath not of long time had any relation to the office or employment of the perſon to whom it hath been attributed, as to carrying of arms, &c. but hath been merely a title of dignity, and next in degree to a knight. For thoſe to whom this title is now due, ſee the article COMMONALTY. Officers of the king's courts, and of the king's houſehold, counſellors at law, juſtices of the peace, are only *eſquires* in reputation; and he who is a juſtice of peace has this title only during the time he is in commiſſion, and no longer, if he is not otherwiſe qualified to bear it. A ſheriff of a county being a ſuperior officer, bears the title of *eſquire* during his life; in reſpect of the great truſt he has in the commonwealth. The chief of ſome ancient families are eſquires by preſcription; and in late acts of parliament for poll-money, many wealthy perſons commonly reputed to be ſuch, were ranked among the eſquires of this kingdom.

There is a general opinion, that every gentleman of landed property who has L. 300 a-year, is an eſquire; which is a vulgar error: for no money whatſoever, or landed property, will give a man properly this title, unleſs he comes within one of the above rules: and no perſon can aſcribe this title where it is not due, unleſs he pleaſes; there being no difficulty in drawing the line by the accounts given above and in the article COMMONALTY: but the meaner ranks of people, who know no better, do often baſely proſtitute this title; and, to the great confuſion of all rank and precedence, every man who makes a decent appearance, far from thinking himſelf any way ridiculed by finding the ſuperſcription of his letters thus decorated, is fully gratified by ſuch an addreſs.

ESQUIRES *of the King*, are ſuch as have that title by creation, wherein there is ſome formality uſed, as the putting about their necks a collar of SS, and beſtowing on them a pair of ſilver ſpurs, &c.

ESSAY, a trial or experiment for proving the quality of any thing; or an attempt to learn, whether or not any invention will ſucceed.

ESSAY, in literature, a peculiar kind of compoſition, the character whereof is to be free, eaſy, and natural; not tied to ſtrict order or method, nor worked up and finiſhed like a formal ſyſtem.

ESSAYS, in metallurgy, are chemical operations made in ſmall, to *determine the quantity* of metal or other matter which is contained in minerals, or to *diſcover the value or purity* of any maſs of gold or ſilver.

We ſhall treat here of the latter kind; referring for the former, to METALLURGY.

1. *Eſſay of the Value of Silver*, to examine its purity, or the quantity of alloy mixed with it. The common method of examining the purity of ſilver, is by mixing it with a quantity of lead proportionable to the quantity of imperfect metals with which it is ſuppoſed to be alloyed; by teſting this mixture; and afterwards by weighing the remaining button of ſilver. The loſs of weight which the ſilver ſuffers by cupellation ſhews the quantity of imperfect metals which it contained.

We may hence perceive, that the eſſay of ſilver is nothing elſe than the refining of it by cupellation. The only difference between theſe two operations is, That when ſilver is teſted merely for the purpoſe of refining it, its value is generally known; and it is therefore mixed with the due proportion of lead, and teſted without any neceſſity of attending to the loſs of weight it ſuſtains during the operation: whereas, in the eſſay, all poſſible methods ought to be employed to aſcertain preciſely this loſs of weight. The firſt of theſe operations, or the mere refining of ſilver, is made in the great, in the ſmelting of ſilver ores, and in mints for making money *. The ſecond operation is never made but in ſmall; becauſe the expences of ſmall operations are leſs than of great, and in the requiſite accuracy is more eaſily attended to. The laſt operation is our preſent ſubject, and is to be performed in the following manner.

* See *Refining*.

We ſuppoſe, firſt, that the maſs or ingot of ſilver, of which an eſſay is to be made, conſiſts of 12 parts perfectly equal; and theſe 12 parts are called *penny-weights*. Thus, if the ingot of ſilver be an ounce weight, each of theſe 12 parts will be $\frac{1}{12}$ of an ounce; or if it be a mark, each of theſe will be $\frac{1}{12}$ of a mark, &c. Hence if the maſs of ſilver be free from all alloy, it is called *ſilver of* 12 *penny-weights;* if it contains $\frac{1}{12}$ of its weight of alloy, it is called *ſilver of* 11 *penny-weights;* if $\frac{2}{12}$ of its weight be alloy, it is called *ſilver of* 10 *penny-weights;* and theſe 10 penny-weights or parts of pure ſilver are called *fine penny-weights*.

Chem. Dict.

We ought to obſerve here concerning theſe penny-weights, that eſſayers give alſo the name *penny-weight* to a weight equal to 24 real grains: which latter real penny-weight muſt not be confounded with the former, which is only ideal and proportional; and ſuch a confuſion is the more likely to take place, as this ideal penny-weight is alſo, like the former, divided into 24 ideal grains, which are called *fine grains*.

An ingot of fine ſilver, or ſilver of 12 penny-weights, contains then 288 fine grains; if this ingot contains $\frac{1}{288}$ part of alloy, it is ſaid to be *ſilver of* 11 *penny-weight and* 23 *grains;* if it contains $\frac{2}{288}$ of alloy, it is called *ſilver of* 11 *penny-weight and* 22 *grains;* if it contains $\frac{14}{288}$, it is called *ſilver of* 11 *penny-weight and* 10 *grains;* and ſo on. Laſtly, the fine grain has alſo its fractions, as $\frac{1}{2}$, $\frac{1}{4}$ of a grain, &c.

As eſſays to diſcover the value of ſilver are always made in ſmall, eſſayers only take a ſmall portion of an ingot for the trial; and the cuſtom in France is to take 36 real grains for this purpoſe, which is conſequently the largeſt weight they employ, and repreſents 12 fine penny-weights. This weight is ſubdivided into a ſufficient number of other ſmaller weights, which alſo repreſent fractions of fine penny-weights and grains. Thus 18 real grains, which is half of the quantity employed, repreſent ſix fine penny-weights; three real grains repreſent one fine penny-weight, or 24 fine grains; a real grain and a half repreſent 12 fine grains; and $\frac{1}{32}$ part of a real grain repreſents $\frac{1}{4}$ part of a fine grain, which is only $\frac{1}{1152}$ part of a maſs of 12 penny-weights.

We may eaſily perceive, that weights ſo ſmall, and eſſay-balances, ought to be exceedingly accurate. Theſe balances are very ſmall, ſuſpended and incloſed in a box the ſides of which are panes of glaſs, that they may be preſerved from duſt, and that their motion may not be affected by agitated air, ſo as to diſorder their action *.

* See (Eſſay-) *Balance*.

When an eſſay of a maſs or ingot of ſilver is to be made, the cuſtom is to make a double eſſay. For this purpoſe, two fictitious ſemi-marks, each of which may be

Eſſay of Silver.

be equal to 36 real grains, are to be cut from the ingot. Theſe two portions of ſilver ought to be weighed very exactly; and they ought alſo to have been taken from oppoſite ſides of the ingot.

Perſons accuſtomed to theſe operations know pretty nearly the value of ſilver merely by the look of the ingot, and ſtill better by rubbing it on a touchſtone. By the judgment they form of the purity of the ingot, they regulate the quantity of lead which is to be added to it, as this quantity muſt be always proportionable to the quantity of imperfect metal mixed with the ſilver.

Nevertheleſs, this proportion of lead to the alloy has not been preciſely determined. Authors who treat of this ſubject differ much. They who direct the largeſt quantity of lead ſay, that thereby the alloy is more certainly deſtroyed; and others who direct a ſmall quantity of lead, pretend, that no more of that metal ought to be uſed than is abſolutely neceſſary, becauſe it carries off with it always ſome portion of ſilver. Every eſſayer uſes his own particular method of proceeding, to which he is attached.

To aſcertain theſe doubtful points, three chemiſts of the Academy of Sciences at Paris, Meſſrs Hellot, Tillet, and Macquer, were appointed by the French government. They were directed to aſcertain every thing concerning the eſſay of gold and ſilver by authenticated experiments, made under the inſpection of a miniſter whoſe ſuperior knowledge is equal to his deſire of public good, and in preſence of the officers of the mint.

The experiments made by theſe chemiſts, and the conſequent regulation, have determined that four parts of lead are requiſite for one part of ſilver of 11 penny-weight and 12 grains, that ſix parts of lead are requiſite for ſilver of 11 penny-weight, eight parts of lead for ſilver of 10 penny-weight, 10 parts of lead for ſilver of nine penny-weight, and ſo on in the ſame progreſſion.

Two cupels of equal ſize and weight are to be choſen. The cuſtom is to uſe cupels of ſuch a ſize that their weight ſhall be equal to that of one half of the lead employed in the eſſay; becauſe ſuch cupels have been found capable of imbibing all the litharge formed during the operation. Theſe cupels are to be placed together under a muffle in an eſſay-furnace. The fire is to be kindled, and the cupels are to be made red-hot, and to be kept ſo during half an hour at leaſt before any metal be put into them. This precaution is neceſſary to dry and calcine them perfectly; becauſe if they contained any moiſture or inflammable matter, an ebullition and efferveſcence would be occaſioned in the eſſay. When the cupels are heated ſo as to become almoſt white, the lead is to be put into them; the fire is to be encreaſed, which is done by opening the door of the aſh-hole ſo as to admit air, till the lead becomes red, ſmoking, and is agitated by a motion of its parts called its *circulation*, and till its ſurface becomes ſmooth and clear.

Then the ſilver, previouſly beat into ſmall plates for its eaſier fuſion, is to be put into the cupels; the fire is to be continued, and even increaſed, by putting hot coals at the mouth of the muffle, till the ſilver ſhall have *entered the lead*, that is, till it have melted and mixed with the lead. When the melted matter circulates well, the heat is to be diminiſhed by taking away, partly or entirely, the coals put at the mouth of the muffle, and by cloſing more or leſs the doors of the furnace.

Eſſay of Silver.

The heat ought to be regulated ſo, that the eſſays in the cupels ſhall have ſurfaces ſenſibly convex, and ſhall appear ardent, while the cupels are leſs red; that the ſmoke ſhall riſe almoſt to the roof of the muffle; that undulations ſhall be made in all directions upon the ſurfaces of the eſſays, which are called *circulations*; that their middles ſhall be ſmooth, and ſurrounded with a ſmall circle of litharge, which is continually imbibed by the cupels.

The eſſays are to be kept in this ſtate till the operation is finiſhed, that is, till the lead and alloy have ſoaked into the cupel; and the ſurfaces of the buttons of ſilver being no longer covered with a pellicle of litharge, become ſuddenly bright and ſhining, and are then ſaid to *lighten*. If the operation has been well conducted, the two eſſays ought to become bright nearly at the ſame time. When the ſilver has been by this operation well refined, we may ſee, immediately after it has brightened, the ſurface of the ſilver covered with rainbow colours, which quickly undulate and croſs each other, and then the buttons become fixed or ſolid.

The management of the fire is an important article in eſſays. For if the heat be too great, the lead is ſcorified and imbibed by the cupel ſo quickly, that it has not ſufficient time to ſcorify and carry along with it all the alloy; and if the heat be too little, the litharge is gathered upon the ſurface, and does not penetrate the cupel. The eſſayers ſay then, that the eſſay is *choaked* or *drowned*. In this caſe the eſſay does not advance; becauſe the litharge covering the ſurface of the metal defends it from the contact of air, which is abſolutely neceſſary for the calcination of metals.

We have above related the marks of a ſucceſsful eſſay. The heat may be known to be too great, from the convexity of the ſurface of the melted metal; from a too ſtrong circulation; from the too vivid appearance of the cupel, ſo that the colours given to it by the litharge cannot be diſtinguiſhed; and, laſtly, by the ſmoke riſing up to the roof of the muffle, or not being at all viſible from its being ſo ardent and red-hot as not to be diſtinguiſhable. In this caſe, the heat muſt be diminiſhed by ſhutting the door of the aſh-hole: Some eſſayers, for this purpoſe, put round the cupels, ſmall, oblong, cold pieces of baked clay, which they call *inſtruments*.

If, on the contrary, the melted metal have a ſurface not very ſpherical, relatively to its extent; if the cupel appear dark-coloured, and the ſmoke of the eſſay do only creep upon the ſurface; if the circulation be too weak, and the ſcoria, which appears like bright drops, have but a dull motion, and be not ſoaked into the cupel; we may be aſſured that the heat is too weak; much more may we be aſſured of it when the metal *fixes*, as the eſſayers call it. In this caſe, the fire ought to be increaſed by opening the door of the aſh-hole, and by placing large burning coals at the mouth of the muffle, or even by laying them acroſs upon the cupels.

As ſoon as the lead is put into the cupels, the fire is to be increaſed, becauſe they are then cooled by the cold metal; and the lead ought to be quickly melted, to prevent its calx from collecting upon its ſurface in too great quantity before it be formed into litharge; which it would do, and be difficultly fuſed, if the heat were too weak.

When the ſilver is added to the lead, the heat muſt be ſtill increaſed; not only becauſe the ſilver cools the maſs, but becauſe it is leſs fuſible than lead. And as all theſe effects ought to be produced as quickly as poſſible, more heat is at length given than ought to be continued; and therefore, when the ſilver has entered the lead, the heat is to be diminiſhed till it becomes of a due intenſity for the operation.

During the operation, the heat ought gradually to be augmented to the end of it, both becauſe the metallic mixture becomes leſs fuſible as the quantity of lead diminiſhes; and alſo becauſe the lead is more difficultly ſcorifiable, as it is united with a larger proportion of ſilver. Hence the eſſays muſt be rendered very hot before they brighten.

When the operation is finiſhed, the cupels are left in the ſame heat during ſome ſeconds, to give time to the laſt portions of litharge to be entirely abſorbed; becauſe if any of it remained under the buttons of ſilver, it would ſtick to them. The fire is then allowed to extinguiſh, and the cupels to cool gradually, till the buttons have entirely fixed, particularly if they be pretty large; becauſe if they cool too quickly, their ſurfaces fix and contract before the internal maſs, which is thereby ſo ſtrongly compreſſed as to burſt through the external ſolid coat and form vegetations, or even to be entirely detached from the reſt of the maſs, and diſſipated. This is called *the vegetation of the button*. It ought to be carefully prevented, becauſe ſmall bits of ſilver are ſometimes thrown out of the cupel.

Laſtly, when the buttons are thoroughly fixed, they are to be diſengaged from the cupels by a ſmall iron utenſil while they are yet hot; otherwiſe they could not be diſengaged clean and free from part of the cupels which ſtrongly adhere to them when the heat is much diminiſhed.

Nothing then remains to complete the eſſay, but to weigh the buttons. The diminution of weight which they have ſuſtained by cupellation will ſhow the purity or value of the ingot of ſilver.

We ought to obſerve, that as almoſt all lead naturally contains ſilver, and that after cupellation this ſilver is mixed with the ſilver of the ingot in the button of the eſſay; before we employ any lead in this operation, we ought to know how much ſilver it contains, that we may ſubtract this quantity from the weight of the button, when we compute the fineneſs of the ſilver of the ingot eſſayed. For this purpoſe eſſayers generally cupel a certain quantity of their lead ſeparately, and weigh accurately the button of ſilver it yields: or, at the ſame time when they eſſay ſilver, they put into a third cupel, in the muffle, a quantity of lead equal to that employed in both their eſſays; and when the operation is finiſhed, and the buttons are to be weighed, they throw the ſmall button produced from the lead alone into the ſcale which contains the weights; and as this exactly counterpoiſes the ſmall portion of ſilver which the eſſay buttons have received from the lead employed in the cupellation, the weights will ſhew preciſely the quantity of ſilver contained in the ingot, and thus the trouble of calculating is prevented. The ſmall button of ſilver procured from the cupellation of lead alone is called the *witneſs*. But to prevent this trouble, eſſayers generally employ lead which contains no ſilver, ſuch as that from Willach in Carinthia, which is therefore procured by eſſayers.

In the ſecond place, we ſhall obſerve, that a certain quantity of ſilver always paſſes into the cupel, as refiners in the great have long obſerved, and which happens alſo in eſſaying ſmall quantities. The quantity of ſilver thus abſorbed, varies according to the quantity of the lead employed, and the matter and form of the cupels; all which objects will undoubtedly be determined by the above-mentioned chemiſts.

The cupellation which we have now deſcribed is exactly the ſame for eſſays by which the produce of a ſilver ore, or of an ore of another metal containing ſilver, is determined. But as theſe ores contain frequently gold, and ſometimes in conſiderable quantity, when theſe eſſays are made, the buttons of ſilver obtained by the eſſays ought to be ſubjected to the operation called *parting*. See SILVER, REFINING, FURNACE, MUFFLE, and CUPEL.

M. Tillet has publiſhed a memoir, ſhewing that eſſays of ſilver made in the common method are uncertain and not to be depended upon, and that this uncertainty proceeds from the different quantities of ſilver abſorbed by the cupel in different eſſays, according as the heat and other circumſtances happened to vary. He therefore propoſes, in order to render eſſays accurate, to extract from the cupel the quantity of ſilver it has abſorbed during the operation, and to add this particle of ſilver to the button, as theſe two contain the whole quantity of ſilver in the matter eſſayed.

The variations in the different reſults of different eſſayers, or of the ſame eſſayer at different times, upon the ſame maſs of ſilver, are ſufficient proofs of the uncertainty mentioned by M. Tillet. Theſe variations are occaſioned, according to that author, principally from the following cauſes: 1. From the inaccuracy of the balances and weights employed. 2. From the faulty fuſion of the maſs to be eſſayed; by which means, the contained alloy may be unequally diffuſed. 3. From the impurity of the lead, eſpecially from its containing ſilver, which is not always equally diffuſed through its maſs. 4. From the different proportions of lead uſed by different eſſayers. 5. From the difference of the intenſity of heat: for, if the heat be not ſufficiently intenſe, the ſilver will ſtill contain a portion of alloy; and if the heat be too intenſe, too much of the ſilver will be imbibed by the cupel. 6. From the want of care in picking the ſmall particles of ſilver, which frequently adhere to the ſides of the cupel ſeparately, from the principal button. 7. From the ſpurting which ſometimes happens unobſerved by the eſſayer; and which may further falſify the eſſays of other pieces included under the ſame muffle, by the falling of the particles thrown out of one cupel into others adjacent. But, with all the attentions to avoid theſe cauſes of error, the author obtained different reſults from different eſſays of the ſame maſs of ſilver. Nor could he, by any method, make his different eſſays conſiſtent with each other, but by adding to each button the particle extracted from the cupel; and this method he found by accurate experiments to be perfectly exact.

M. Tillet obſerved, that the quantity of lead directed

Eſſay of gold.

ted in the regulations eſtabliſhed in conſequence of the report made by Meſſrs Macquer, Hellot, and Tillet, is not ſufficient to purify the ſilver perfectly from its alloy. He nevertheleſs approves of the ſaid regulation; and conſiders the weight of the alloy retained by the button, as ſome compenſation for the weight of the ſilver abſorbed by the cupel. And as it is a conſtant fact, that the more lead is uſed, the greater is the loſs by the abſorption of the cupel, he remarks, that a regulation, directing a larger proportion of lead for France, than is uſed in other countries, would be diſadvantageous to that kingdom; as thereby the ſilver of the ſame denomination would be required to be finer in that than in other countries where a leſs proportion of lead was employed. He obſerves, that the abovementioned rule, "that the more lead is uſed, the greater is the loſs by the abſorption of the cupel," does not extend to quantities of lead much above double the uſual quantities. Thus 32 parts of lead to one of ſilver, will not occaſion more abſorption than 16 parts of lead. For the refining ſcarcely takes place till the extraordinary quantity of lead be gone, and the ſilver is only or chiefly carried into the cupel along with the copper. Accordingly, he found that he could render the ſilver finer by uſing four parts of lead at firſt, and afterwards adding two more parts when the iriſes began to appear, than by employing all the ſix parts of the lead at once. By this method of dividing the quantity of lead, the loſs of ſilver by abſorption was greater. M. Tillet did not find, that by employing biſmuth alone, or mixed with lead, his eſſays were more certain, than when lead alone was uſed. He obſerved, however, that the addition of biſmuth made the ſilver purer, but occaſioned a greater abſorption by the cupel.

2. *Eſſay of the Value of Gold.* The fictitious weights uſed to determine the purity of gold, and to eſſay this metal, are different from thoſe of ſilver. See the preceding article. A maſs of gold perfectly pure, or which contains no alloy, is ideally divided into 24 parts, called *carats;* this pure gold is therefore called *gold of* 24 *carats.* If the maſs or ingot contains $\frac{1}{24}$ part of its weight of alloy, the gold is then of 23 carats; and if it contains $\frac{2}{24}$ or $\frac{1}{12}$ of alloy, it is gold of 22 carats, &c. Hence we ſee, that the carat of gold is only a relative and proportional weight, ſo that the real weight of the carat varies according to the total weight of the maſs of gold to be examined. If this maſs of gold weighs a mark, the real weight of the carat will be $\frac{1}{24}$ of eight ounces, which is equal to a mark. If the maſs weigh an ounce, the carat will be $\frac{1}{24}$ part of an ounce, or 24 grains. If it is only a penny-weight or 24 grains, the real weight of a carat will be one grain; and ſo on.

For greater accuracy, the carat of gold is divided into 32 parts, which are relative and proportional weights, as the carat itſelf is. Thus $\frac{1}{32}$ of a carat of gold is $\frac{1}{32}$ of $\frac{1}{24}$, or the $\frac{1}{768}$ of any maſs of gold: and the gold which contains an alloy equal to the $\frac{1}{768}$ part of the whole maſs is called *gold of* 23 *carats and* $\frac{31}{32}$; gold which contains $\frac{2}{768}$ of alloy is *gold of* 23 *carats and* $\frac{30}{32}$; and ſo on.

The real weight now generally uſed in the operation for determining the purity of gold, is ſix grains. This weight then repreſents 24 carats. The half of this weight, or three real grains, repreſents 12 carats. According to this progreſſion, we ſhall find that $\frac{1}{4}$ of a real grain repreſents one carat, and the $\frac{1}{128}$ part of a grain repreſents the $\frac{1}{32}$ of a carat, or the $\frac{1}{768}$ part of a maſs of gold to be eſſayed.

Eſſay || Eſſenes.

As theſe weights are exceedingly ſmall, ſome eſſayers employ a weight of 12 grains, which muſt be very convenient.

When a maſs or ingot of gold is to be eſſayed, ſix grains are to be cut off, and exactly weighed: alſo 18 grains of fine ſilver are to be weighed. Theſe two metals are to be cupelled together with about ten times as much lead as the weight of the gold. This cupellation is conducted preciſely like that of the eſſay to determine the purity of the ſilver, excepting that the heat muſt be raiſed a little more towards the end of the operation when the eſſay is going to brighten. Then the gold is freed from all alloy but ſilver. If the quantity of copper or other alloy deſtructible by cupellation be required to be known, the remaining button is accurately weighed. The diminution of weight from the ſum of the weights of the gold and of the ſilver determines the quantity of this alloy.

The button containing gold and ſilver is then to be flattened upon a poliſhed piece of ſteel, and care muſt be taken to anneal it from time to time, to prevent its ſplitting and cracking. By this method it is reduced to a thin plate, which is to be rolled up, in order to be parted by aqua fortis *. The diminution found after the parting from the original weight of the gold eſſayed, ſhews the whole quantity of alloy contained in that gold.

The eſſay for determining the purity of gold is then made by two operations: the firſt, which is cupellation, deprives it of all its imperfect metals; and the ſecond, which is parting, ſeparates all the ſilver from it. By antimony alſo gold may be purified, which is a kind of dry parting. By this ſingle operation, all the imperfect metals, and ſilver with which gold is allayed, are ſeparated. See Purification, Gold, Silver, Refining.

Essay-*Hatch*, is the miners term for a little trench or hole, which they dig to ſearch for ſhoad or ore.

ESSENCE, in metaphyſics, that which conſtitutes the particular nature of each genus or kind, and diſtinguiſhes it from all others; being nothing but that abſtract idea to which this name is affixed, ſo that every thing contained in it is eſſential to that particular kind.

This Mr Locke calls the *nominal eſſence;* in contradiſtinction to the real eſſence, or conſtitution of ſubſtances on which this nominal eſſence depends. Thus, the nominal eſſence of gold, is that complex idea the word *gold* ſtands for; let it be, for inſtance, a body, yellow, weighty, malleable, fuſible, and fixed: but its real eſſence is the conſtitution of its inſenſible parts, on which thoſe qualities and all its other properties depend, which is wholly unknown to us.

ESSENES, or Essenians, in Jewiſh antiquity, one of the three ancient ſects among that people. They allowed a future ſtate, but denied a reſurrection from the dead. Their way of life was very ſingular: they did not marry; but adopted the children of others, whom they bred up in the inſtitutions of their ſect: they deſpiſed riches, and had all things in common, and never changed their cloaths till they were entirely worn

* See Parting.

worn out. When initiated, they were ſtrictly bound not to communicate the myſteries of their ſect to others; and if any of their members were found guilty of enormous crimes, they were expelled.

Pliny tells us, that they dwelt on the weſt ſide of the lake of Aſphaltites; and that they were a ſolitary kind of men, living without women or money, and feeding upon the fruit of the palm-tree: he adds, that they were conſtantly recruited by new comers, whom the ſurges of ill fortune had made weary of the world; in which manner the ſect was kept up for ſeveral thouſands of years, without any being born among them. The reaſon why we find no mention made of them in the New Teſtament, may be their recluſe and retired way of life, not leſs than their great ſimplicity and honeſty, whereby they lay open to no cenſure or reproof.

ESSENTIAL, ſomething neceſſarily belonging to a thing, from which it cannot be conceived diſtinct: thus the primary qualities of bodies, as extenſion, figure, number, &c. are eſſential or inſeparable from them in all their changes and alterations.

Essential *Oil*. See Chemistry, n° 487.

ESSEX, a county of England, bounded on the eaſt by the ſea; on the north by Suffolk and Cambridgeſhire, from which it is parted by the Stour; on the ſouth, it is parted from Kent by the Thames; and on the weſt from Middleſex by the river Lea, and from Hertfordſhire by the Stort. It extends from eaſt to weſt 40 miles in length, 35 in breadth from north to ſouth, and 140 in circumference. It is in the dioceſe of London, and gives title of earl to the family of Capel. The ſoil of the inland parts is generally ſandy or gravelly, and the air good; but in the low fenny grounds along the Thames, and on the ſea-coaſt, it is aguiſh and unhealthy. The county in ſome places produces a great deal of ſaffron, as about Saffron Walden. It is well ſupplied both with ſea and river fiſh, wood, and wild-fowl. Vaſt numbers of oxen, horſes, ſheep, and cows, are fed and bred in the fens; a great deal of corn is raiſed, and cheeſe made; the ſoil being there as rich as the air is bad. In this county, too, a great ſum of money is got by decoys.

ESTATE, in law, ſignifies the title or intereſt that a perſon has in lands, tenements, or other effects; comprehending the whole in which a perſon hath any property, and will paſs the ſame.

Eſtates are either real or perſonal; otherwiſe diſtinguiſhed into freeholds, which deſcend to heirs; or chattels, that go to executors or adminiſtrators.

A fee-ſimple is the ampleſt eſtate our law admits of. See Fee.

Eſtates are obtained ſeveral ways; as, by deſcent from a father to a ſon; by conveyance or grant, from one perſon to another; by gift or purchaſe; or by deed or will. See Descent, Succession, Tenure, &c.

Estates, in a political ſenſe, is uſed either to denote the dominions of ſome prince, or the general claſſes into which the people are divided.

In Britain, the eſtates are the king, lords, and commons; or rather the lords and commons, who meet the king in parliament, for reforming abuſes, and enacting good and wholeſome laws.

ELESTE', in heraldry, denotes the heads of beaſts torn off by main force.

ESTHER, a canonical book of the Old Teſtament; containing the hiſtory of a Jewiſh virgin, dwelling with her uncle Mordecai at Shuſhan, in the reign of Ahaſuerus one of the kings of Perſia.

The great beauty of this maid raiſed her to the throne of Perſia; whereby ſhe had an opportunity to ſave her countrymen, whoſe deſtruction was plotted by Haman, a favourite of that prince.

The learned are not agreed who this Ahaſuerus was. Archbiſhop Uſher ſuppoſes him to be Darius Hyſtaſpes, and Artyſtona to be Eſther. Scaliger makes him the ſame with Xerxes, and his queen Hameſtris to be Eſther. Joſephus, on the contrary, poſitively aſſerts, that the Ahaſuerus of the ſcriptures, is the Artaxerxes Longimanus of profane ſtory; and the Septuagint, throughout the whole book of Eſther, tranſlate Ahaſuerus by Artaxerxes. Moſt people ſubſcribe to this laſt opinion; and, indeed the extraordinary kindneſs ſhewed by Artaxerxes to the Jews, can ſcarce be accounted for otherwiſe, than by ſuppoſing that they had ſo powerful an advocate as Eſther to ſolicite for them.

**ESTOILE`E**, or Cross Estoille`e, in heraldry, a ſtar with only four long rays in form of a croſs; and, accordingly, broad in the centre, and terminating in ſharp points.

ESTRAY, in law, any beaſt not wild, that is found within a lordſhip, and owned by nobody: in which caſe, being cried, according to law, in the two market-towns adjacent, and not claimed in a year and a day by the owner, it becomes the property of the lord of the manor or liberty wherein it was found.

ESTONIA, is a province of the Ruſſian empire, and part of Livonia. It is bounded on the eaſt by the Baltic ſea, on the north by the Gulph of Finland, on the weſt by Ingria, and on the ſouth by Lettonia. It is divided into ſix diſtricts: 1 Harrien; 2. Wireland; 3. Alentakin; 4. Wich; 5. Jerven; and, 6. Odepoa. The principal towns are, Revel, Weiſenberg, Borchholm, Narva, Nyſlot, Habſal, Derpt, St Elin, Pernau, and Roderſwick.

In former times the inhabitants of this country carried on a good trade in corn, which was dried in ſtoves: but wars have much depopulated the country, inſomuch that not a fourth part of it is inhabited, and a great number of gentlemens ſeats lie in ruins.

ESTREMADURA, a province of Spain, has New Caſtile on the eaſt, Leon on the north, Andaluſia on the ſouth, and Portugal on the weſt. It is 175 miles in length, and 100 in breadth; and its principal towns are, Calatrava, Menda, and Badajoz, on the river Guadiana; Alcantara, on the Tajo; and Cona and Placentia, to the north of this river.

This province enjoys a very pure and healthful air, and its mountains are full of wild and tame animals; they having woods and foreſts for the one ſort, and paſtures for the other. The fields are planted with fruit-trees, which bear all kinds of delicious fruit. The vineyards produce excellent wines of all colours, and the fields yield plenty of corn.

Estremadura, a province of Portugal, near the mouth of the Tagus or Tajo, is bounded on the north by Beira, on the eaſt and ſouth by Alentejo, and on the weſt by the Atlantic Ocean. It is about 88 miles in length, and 45 in breadth. This province is divided into ſix comarcas, viz. Litria, Liſbon, Tomar, Santaren, and Alanquar, to the north of the Tagus; and that of Setubal, to the ſouth of this river. Theſe are likewiſe the principal towns. Eſtremadura is equal, if not preferable, to any other province in Spain or Portugal. The diſtrict of Santaren produces ſuch plenty of corn, and feeds ſo many flocks of ſheep, that it may enter into competition with Sicily. The fruits and the wines are all excellent; and it was here that the ſweet oranges brought from China were firſt planted, and of which there are large quantities tranſported to foreign parts, with the wines and other fruits. The fields are covered with flowers almoſt all the year, from which the bees collect large quantities of fine honey. The olive-trees are numerous, from which they have excellent oil. The rivers abound with good fiſh, and the mountains have quarries of ſeveral kinds.

ETCHING, a method of engraving on copper, in which the lines or ſtrokes, inſtead of being cut with a tool or graver, are eaten in with aquafortis.

Etching is of a later invention, though not very modern, than engraving with the tool; of which it was at firſt only an imitation, that was practiſed by painters and other artiſts, who could much ſooner form their hand to, and attain a faculty of, working in this way, than with the graver. But being then nevertheleſs conſidered as a counterfeit kind of engraving, and therefore inferior to the other, it was cultivated in a very confined manner; the cloſeneſs of the reſemblance of the work to that performed by the tool, being made the teſt of its merit, and conſequently the principal object of aim in thoſe who purſued it. This ſervile confinement of the art of etching to the imitation of the original kind of engraving, was a great cauſe of retarding its advancement towards perfection, as many of the moſt able maſters cramped their talents with the obſervance of it: which may be ſeen in the inſtances of Sadelers, Swauneberg, Vilamene, and particularly Le Boſſe; who, in his treatiſe on engraving, has laid down as a principle, that the perfection of this kind conſiſts in the cloſe ſimilitude of the work with that done by the tool. This abſurd prepoſſeſſion has been ſince worn out: and the method of working with aquafortis has been ſo far improved, that, inſtead of being now deemed a ſpurious kind of engraving, it evidently appears the foundation of an excellence in many modern works, that could never have been produced without it: ſince, though the neatneſs and uniformity of the hatches, which attend the uſe of the tool, is more advantageous with reſpect to portraits; yet the liberty and facility of the other manner give a much greater opportunity to exerciſe the force of genius and fancy in hiſtory-engraving; where the effect of the whole, and not the minute exactneſs in finiſhing all the parts, conſtitutes the principal value. There are two methods practiſed of engraving in this way; the one with a hard varniſh or ground, the other with a ſoft. The firſt was formerly much uſed, being better accommodated to the intention of imitating the engraving with the tool; as the firmneſs of the body of the varniſh gave more opportunity of retouching the lines, or enlarging them with the oval-pointed needles, called by the French *echoppes*, as was practiſed by Le Boſſe and others for that purpoſe. The latter has now almoſt wholly ſuperſeded the uſe of the other, by the free manner of working it admits of; which affords a power of expreſſion incompatible with the greater inflexibility of the hard varniſh, that confines the lines and hatches to ſuch a regularity and ſameneſs, as gives a ſtiffneſs of manner and coldneſs of effect to the work.

The mixture of the uſe of the tool and aquafortis, which are now both employed in many caſes, has, however, given that perfection to engraving which it poſſeſſes at preſent. The truth and ſpirit of the outline, that the method of working with aquafortis affords, and the variety of ſhades which the different kinds of black produce in this way, as well as other means of expreſſing the peculiar appearance and character of particular ſubjects, furniſh what was defective in the ſole uſe of the tool; while, on the other hand, the exactneſs and regularity of the lines, which are required for finiſhing many kinds of deſigns, are ſupplied by the graver; and by a judicious application of both, that complete finiſhing is obtained, which either of them alone muſt neceſſarily want.

The manner by which this art is performed, is the covering the ſurface of the plate with a proper varniſh or *ground*, as it is called, which is capable of reſiſting aquafortis; and then ſcoring or ſcratching away, by inſtruments reſembling needles, the parts of this varniſh or ground, in the places where the ſtrokes or hatches of the engraving are intended to be: then, the plate being covered with aquafortis, the parts that are laid naked and expoſed by removing the ground or varniſh, are corroded or eaten away by it; while the reſt, being ſecured and defended, remain untouched.

There are two methods of etching, as hath been already obſerved; the difference of which from each other conſiſts, as well in the difference of the varniſh or ground, as in that of the aquafortis, adapted to each kind: but the general methods of performing them are alike in both. Theſe varniſhes or grounds are diſtinguiſhed by the names of *hard* and *ſoft*: for, in their conſiſtence, or the reſiſtance they give to the needles, lies their eſſential variation from each other. The hard varniſh, it is with good reaſon conjectured, was not the firſt in uſe: but ſoon took place of the other; and was, for ſome time, the moſt received in practice, on account of its admitting the work to be made more like that of the graver: the ſoft has, however, ſince, in its turn, prevailed to the excluſion of it in ſome degree, except in the caſe of particular ſubjects; but not ſo entirely as to take away the expedience of ſhewing how it is performed. The manner of etching with the ſoft varniſh is now, however, one of the moſt important objects of the art of engraving; and it is at preſent in univerſal uſe, ſometimes alone, but more frequently intermixed with the work of the tool, and, in ſome caſes, with great advantage, even where the whole is intended to paſs for being performed by the graver.

Preparation of the ſoft varniſh; according to Mr Lawrence, an eminent Engliſh engraver at Paris.

“Take of virgin's wax and aſphaltum, each two ounces; of black pitch and Burgundy pitch, each half an ounce. Melt the wax and pitch in a new earthenware glazed pot; and add to them, by degrees, the aſphaltum finely powdered. Let the whole boil, till ſuch time as that, taking a drop upon a plate, it will break when it is cold, on bending it double two or three times betwixt the fingers. The varniſh being then enough boiled, muſt be taken off the fire; and, letting it cool a little, muſt be poured into warm water, that it may work the more eaſily with the hands, ſo as to be formed into balls; which muſt be rolled up, and put into a piece of taffety for uſe."

It muſt be obſerved, firſt, that the fire be not too violent, for fear of burning the ingredients; a ſlight ſimmering will be ſufficient: ſecondly, that while the aſphaltum is putting in, and even after it is mixed with them, the ingredients ſhould be ſtirred continually with the ſpatula: and thirdly, that the water, into which this compoſition is thrown, ſhould be nearly of the ſame degree of warmth with it, to prevent a kind of cracking that happens when the water is too cold.

The varniſh ought always to be harder in ſummer than in winter; and it will become ſo if it be ſuffered to boil longer, or if a greater proportion of the aſphaltum or brown reſin be uſed. The experiment abovementioned, of the drop ſuffered to cool, will determine the degree of hardneſs or ſoftneſs that may be ſuitable to the ſeaſon when it is uſed.

Preparation of the hard varniſh uſed by Callot, commonly called the Florence varniſh.

TAKE four ounces of fat oil very clear, and made of good linſeed oil, like that uſed by painters: heat it in a clean pot of glazed earthen-ware, and afterwards put to it four ounces of maſtich well powdered; and ſtir the mixture briſkly, till the whole be well melted; then paſs the whole maſs through a piece of fine linen, into a glaſs bottle with a long neck, that can be ſtopped very ſecurely; and keep it for the uſe that will be below explained.

Method of applying the ſoft varniſh to the plate, and of blackening it.

THE plate being well poliſhed and burniſhed, as alſo cleanſed from all greaſineſs by chalk or Spaniſh white, fix a hand-vice on the edge of the plate where no work is intended to be, to ſerve as a handle for managing it when warm: then put it upon a chaſing-diſh, in which there is a moderate fire; obſerving to hold it ſo, that it may not burn: keep the plate over the fire till it be ſo hot, that the varniſh being brought into contact with it, may melt: then cover the whole plate equally with a thin coat of the varniſh; and while the plate is warm, and the varniſh upon it in a fluid ſtate, beat every part of the varniſh gently with a ſmall ball or dauber made of cotton tied up in taffety; which operation ſmooths and diſtributes the varniſh equally over the plate.

When the plate is thus uniformly and thinly covered with the varniſh, it muſt be blackened by a piece of flambeau, or of a large candle, which affords a copious ſmoke; ſometimes two, or even four, ſuch candles are uſed together for the ſake of diſpatch, that the varniſh may not grow cold: which if it does during the operation, the plate muſt then be heated again, that it may be in a melted ſtate when that operation is performed: but great care muſt be taken not to burn it; which, when it happens, may be eaſily perceived by the varniſh appearing burnt and loſing its gloſs. The following expedient is made uſe of for the more commodiouſly blackening the varniſh, being particularly neceſſary where the plates are large: Fix a ſtrong hook in the roof of the room, through which paſs four pieces of cord of equal length, at the end of which are fixed four iron rings of about four inches diameter, for ſupporting the corners of the plate. The plate being thus ſuſpended in the air, with the varniſhed ſide downwards, may be blackened with great convenience: but this is not, however, abſolutely requiſite, except in the caſe of large plates that could not, without difficulty, be held up, unleſs this, or ſome other ſuch contrivance, were made uſe of.

It is proper to be very cautious in keeping the flambeau or candle at a due diſtance from the plate, leſt the wick touch the varniſh, which would both ſully and mark it. If it appear that the ſmoke has not penetrated the varniſh, the plate muſt be again placed for ſome little time over the chafing-diſh; and it will be found, that, in proportion as the plate grows hot, the varniſh will melt and incorporate with the black which lay above it, in ſuch a manner that the whole will be equally pervaded by it.

Above all things, the greateſt caution ſhould be uſed in this operation, to keep all the time a moderate fire; and to move frequently the plate, and change the place of all the parts of it, that the varniſh may be alike melted every where, and kept from burning. Care muſt alſo be taken, that during this time, and even till the varniſh be entirely cold, no filth, ſparks, or duſt, fly on it; for they would then ſtick faſt, and ſpoil the work.

Method of applying the hard varniſh.

THIS is preciſely the ſame as for the ſoft; being ſpread equally over the warm plate with the taffety-ball, and ſmoked in the ſame manner: only after it is ſmoked, it muſt be baked, or dried over a gentle fire of charcoal, till the ſmoke from the varniſh begins to decreaſe; taking care not to overheat the plate, which would both ſoften it and burn the varniſh.

The plate being thus prepared, and an exact drawing of the outlines of the deſign made upon thin paper, the other ſide of the paper muſt be well rubbed with chalk, or Spaniſh whitening, or, which is better, with red chalk ſcraped to a powder; and the looſe chalk is cleared off with a linen rag: then the ſtained ſide of the paper is laid upon the varniſh, fixing the corners to the plate with wax or wafers, to prevent its ſhuffling; and with a blunted needle, or pointer, the drawing is ſlightly traced, and communicates to the varniſh an exact outline of the deſign to be etched.

A variety of pointers is neceſſary for the work. Thoſe uſed for the broad large ſtrokes ought to be very blunt, exceeding round, and well poliſhed at the point; the ſoal of a ſhoe anſwers very well for poliſhing the points. The fineſt ought to be as ſharp as a needle. If any ſcratches or falſe ſtrokes happen in the working, they are to be ſtopped up with a hair-pencil dipped in Venetian varniſh, mixed with lamp-black, by which means theſe places will be defended from the action of the aquafortis.

The next operation is that of eating or corroding the plate with aquafortis; in order to which, a border of ſoft wax (being a compoſition of bees-wax melted and tempered with a little Venice turpentine and tallow), muſt be faſtened round the plate about an inch high, in the form of a little wall or rampart, to contain the aquafortis. At one of the corners of this border a gutter is uſually made, which ſerves for pouring commodiouſly the aquafortis off the plate. The plate being thus bordered, take a due quantity of the refiners aquafortis; mix it with half its quantity of common water; and pour it gently on, till it riſe above a finger's breadth above the ſurface of the plate: when, if all things have been rightly conducted, it will be ſeen that the aquafortis will ſoon exert its action in the hatches which have been ſtrongly touched; but thoſe more weakly engraved will appear at firſt clear, and of the colour of the copper. The menſtruum muſt therefore be ſuffered to continue on the plate till its effects become viſible on the more tender parts: then the aquafortis ſhould be poured off, the plate waſhed with clean water, and dried before the fire: then take a ſmall pencil dipped into the Venetian varniſh, and cover with it the lighter parts of the plate. This being done, the aquafortis muſt again be poured on, and ſuffered to continue a longer or ſhorter time, according to the ſtrength of the menſtruum, or the nature of the engraving; when it muſt be again poured off as before, and the plate immediately waſhed with water.

It may not be improper to obſerve, that, when the aquafortis is on the plate, a feather ſhould be uſed to cleanſe away the foulneſs of the verdigreaſe that gathers in the hatches when the aquafortis operates on them, and to give it more room to exert its action; for by moving the aquafortis to and fro on the plate by the feather, and bruſhing away the black ſaline matter where it appears to be formed, the hatches will be cleanſed, and the aquafortis exert its whole force equally on every part.

The plate being thus ſufficiently corroded by the aquafortis, and well waſhed with water, it muſt be warmed at the fire, and the border of wax removed; after which, it muſt be made hotter till the varniſh melt: then it muſt be well wiped with a linen cloth, and afterwards rubbed heartily with oil of olives; when it will be ready to be retouched and finiſhed by the graver. See the article Engraving.

ETERNITY, an attribute of God, expreſſing his infinite or endleſs duration.

According to Mr Locke, we come by an idea of eternity, by being able to repeat any part of time, as a year, as often as we will, without ever coming to an end.

ETHELBALD,
ETHELBERT,
ETHELRED,
ETHELWOLF, } kings of England. { See (Hiſtory of) England.

ETHER, is uſually underſtood of a thin, ſubtile matter, or medium, much finer and rarer than air; which commencing from the limits of our atmoſphere, poſſeſſes the whole heavenly ſpace.—The word is Greek, αιθηρ, ſuppoſed to be formed from the verb αιθειν, "to burn, to flame;" ſome of the ancients, particularly Anaxagoras, ſuppoſing it of the nature of fire †.

† See *Fire.*

The philoſophers cannot conceive that the largeſt part of the creation ſhould be perfectly void; and therefore they fill it with a ſpecies of matter under the denomination of *ether*. But they vary extremely as to the nature and character of this ether. Some conceive it as a body *ſui generis*, appointed only to fill up the vacuities between the heavenly bodies; and therefore confined to the regions above our atmoſphere. Others ſuppoſe it of ſo ſubtile and penetrating a nature, as to pervade the air, and other bodies, and poſſeſs the pores and intervals thereof. Others deny the exiſtence of any ſuch ſpecific matter; and think the air it ſelf, by that immenſe tenuity and expanſion it is found capable of, may diffuſe itſelf through the interſtellar ſpaces, and be the only matter found therein.

In effect, ether, being no object of our ſenſe, but the mere work of imagination, brought only upon the ſtage for the ſake of hypotheſis, or to ſolve ſome phenomenon, real or imaginary; authors take the liberty to modify it how they pleaſe. Some ſuppoſe it of an elementary nature, like other bodies; and only diſtinguiſhed by its tenuity, and the other affections conſequent thereon: which is the philoſophical ether. Others will have it of another ſpecies, and not elementary; but rather a ſort of fifth element, of a purer, more refined, and ſpirituous nature, than the ſubſtances about our earth: and void of the common affections thereof, as gravity, &c. The heavenly ſpaces being the ſuppoſed region or reſidence of a more exalted claſs of beings, the medium muſt be more exalted in proportion. Such is the ancient and popular idea of ether, or etherial matter. See Etherial.

The term *ether* being thus embarraſſed with a variety of ideas, and arbitrarily applied to ſo many different things; the later and ſeverer philoſophers chooſe to ſet it aſide, and in lieu thereof ſubſtitute other more determinate ones. Thus, the Carteſians uſe the term *materia ſubtilis;* which is their ether: and Sir Iſaac Newton, ſometimes a *ſubtile ſpirit*, as in the cloſe of his *Principia;* and ſometimes a *ſubtile* or *ethereal medium*, as in his Optics.

The truth is, there are abundance of conſiderations, which ſeem to evince the exiſtence of ſome matter in the air, much finer than the air itſelf. There is an unknown ſomething, which remains behind when the air is taken away; as appears from certain effects which we ſee produced *in vacuo*. Heat, Sir Iſaac Newton obſerves, is communicated through a vacuum, almoſt as readily as through air: but ſuch communication cannot be without ſome interjacent body, to act as a medium. And ſuch body may be ſubtile enough to penetrate the pores of glaſs; and may be very well concluded to permeate thoſe of all other bodies, and conſequently be diffuſed through all the parts of ſpace: which anſwers to the full character of an ether †.

† See Heat.

The exiſtence of ſuch an etherial medium being ſettled, that author proceeds to its properties; inferring it to be not only rarer and more fluid than air, but exceedingly more elaſtic and active: in virtue of which properties, he ſhews, that a great part of the phenomena of nature may be produced by it. To the weight, *e. g.* of this medium, he attributes gravitation, or the weight of all other bodies; and to its elaſticity, the elaſtic force of the air and of nervous fibres, and the emiſſion, refraction, reflection, and other phenomena of light; as alſo, ſenſation, muſcular motion, &c. In fine, this ſame matter ſeems the *primum mobile*, the firſt ſource or ſpring of phyſical action in the modern ſyſtem.

The Carteſian ether is ſuppoſed not only to pervade, but adequately to fill, all the vacuities of bodies; and thus to make an abſolute plenum in the univerſe.

But Sir Iſaac Newton overturns this opinion, from divers conſiderations; by ſhewing, that the celeſtial ſpaces are void of all ſenſible reſiſtance: for, hence it follows, that the matter contained therein muſt be immenſely rare, in regard the reſiſtance of bodies is chiefly as their denſity; ſo that if the heavens were thus adequately filled with a medium or matter, how ſubtile ſoever, they would reſiſt the motion of the planets and comets much more than quickſilver, or gold.

The late diſcoveries in electricity have thrown great light upon this ſubject, and rendered it extremely probable, that the ether ſo often talked of is no other than the electric fluid, or ſolar light, which diffuſes itſelf throughout the whole ſyſtem of nature. See Electricity, Fire, Heat, Light, &c.

Ether, in chemiſtry, an exceedingly light, volatile, and inflammable fluid, made by combining ardent ſpirits with acids. For

Ether *Marine*. See Chemistry, n° 261.
Ether *Nitrous*. *Ibid.* n° 218.
Ether *Saccharine*. *Ibid.* n° 305.
Ether *Vegetable*. *Ibid.* n° 290.
Ether *Vitriolic*. *Ibid.* n° 167.

ETHERIAL, Etherius, ſomething that belongs to, or partakes of, the nature of ether. See Ether. Thus we ſay, the *etherial ſpace*, *etherial regions*, &c.

Some of the ancients divided the univerſe, with reſpect to the matter contained therein, into elementary and etherial.

ETHERIDGE (Sir George), a celebrated wit and comic genius in the reigns of Charles II. and James II. deſcended from an ancient family in Oxfordſhire, and born in 1636. He travelled in his youth; and, not being able to confine himſelf to the ſtudy of the law, devoted himſelf to the gayer accompliſhments. His firſt dramatic performance, *The Comical Revenge*, or *Love in a Tub*, appeared in 1664, and introduced him to the leading wits of the time: in 1668, he produced a comedy called *She would if ſhe could:* and, in 1676, he publiſhed his laſt comedy, called *The man of mode, or Sir Fopling Flutter;* which is perhaps the moſt elegant comedy, and contains more of the real manners of high life than any one the Engliſh ſtage was ever adorned with. This piece he dedicated to the beautiful ducheſs of York, in whoſe ſervice he then was; and who had ſo high a regard for him, that when, on the acceſſion of James II. ſhe came to be queen, ſhe procured his being ſent ambaſſador firſt to Hamburg, and afterwards to Ratiſbon, where he continued till after his majeſty quitted the kingdom. Our author being addicted to certain gay extravagances, had greatly impaired his fortune; to repair which, he paid his addreſſes to a rich widow: but ſhe, being an ambitious woman, had determined not to condeſcend to a marriage with any man who could not beſtow a title upon her; on which account, he was obliged to purchaſe a knighthood.

None of the writers have exactly fixed the period of Sir George's death, though all ſeem to place it not long after the Revolution. Some ſay, that on this event he followed his maſter king James into France, and died there; but the authors of the Biographia Britannica mention a report, that he came to an untimely death by an unlucky accident at Ratiſbon; for that after having treated ſome company with a liberal entertainment at his houſe there, where he had taken his glaſs too freely, and being, through his great complaiſance, too forward in waiting on his gueſts at their departure, fluſhed as he was, he tumbled down ſtairs and broke his neck, and ſo fell a martyr to mirth and jollity.

As to Sir George's literary character, he certainly was born a poet, and ſeems to have been poſſeſſed of a genius whoſe vivacity needed no cultivation; for we have no proofs of his having been a ſcholar. His works, however, have not eſcaped cenſure on account of that licentiouſneſs which in general runs through them, which renders them dangerous to young unguarded minds; and the more ſo, for the lively and genuine wit with which it is gilded over, and which has therefore juſtly baniſhed them from the purity of the preſent ſtage.

ETHICS, the doctrine of manners, or the ſcience of moral philoſophy. The word is formed from ηθος, ηθη, *mores*, "manners;" by reaſon the ſcope or object thereof is to form the manners. See Moral *Philoſophy*.

ETHIOPIA, a large empire in Africa, formerly bounded on the north, by Egypt; on the weſt, by Libya Interior; on the eaſt, by the Red Sea; and on the ſouth, by a part of Africa unknown to the ancients; as indeed its boundaries, and the kingdom itſelf, are to this day very much unknown to our modern geographers. This country had various names given it by the ancients. Sometimes they called it *India*, and the inhabitants *Indians;* which name they applied to many other remote nations. It was likewiſe denominated *Atlantia* and *Etheria*, and in very early ages *Cephenia*. The moſt uſual name, however, was *Abaſene;* a word ſomewhat reſembling *Abaſſia*, one of the modern names of Ethiopia. On the other hand, we find Chaldea, Aſſyria, Perſia, &c. ſtyled *Ethiopia* by ſome authors; and it is certain that the ancients called all thoſe countries extending along the Red Sea, indifferently by the names of *India* and *Ethiopia*. By the Jews it was called *Cuſh* and *Ludim*.

The hiſtory of this country is almoſt totally unknown, except where its kings had wars with ſome other nations, as the Egyptians, Jews, or Romans; for an account of which, ſee the articles Egypt, Judæa, Rome, &c. Concerning the manners and cuſtoms of its inhabitants, ancient authors give us the following information.

Diod. Sic. p. 101, 102.

They had many laws which were very different from thoſe of other nations; eſpecially their laws relating to the election of kings. The prieſts choſe the moſt reputable men of their body, and drew a large circle around them, which they were not to paſs. A prieſt entered the circle, running and jumping like an *Ægipan* or a ſatyr. He of thoſe that were incloſed in the circle who firſt catched hold of the prieſt, was immediately declared king; and all the people paid him homage, as a perſon entruſted with the government of the nation by Divine Providence. The new-elected king immediately began to live in the manner which was preſcribed to him by the laws. In all things he exactly followed the cuſtoms of the country; he paid a moſt rigid attention to the rules eſtabliſhed from the origin of the nation, in diſpenſing rewards and puniſhments. The king could not order a ſubject to be put to death, though he had been capitally convicted in a court of juſtice. But he ſent an officer to him, who ſhowed him the ſignal of death. The criminal then ſhut himſelf up in his houſe, and was his own executioner. It was not permitted him to fly to a neighbouring country, and ſubſtitute baniſhment for death; a relaxation of the rigour of the law, with which criminals were indulged in Greece.

We have the following extraordinary information with regard to the death of many of their kings.—The prieſts of Meroè, who had acquired great power there, when they thought proper, diſpatched a courier to the king to order him to die. The courier was commiſſioned to tell him, that it was the will of the gods, and that it would be the moſt heinous of crimes to oppoſe an order which came from *them*. Their firſt kings obeyed theſe groundleſs deſpotical ſentences, though they were only conſtrained to ſuch obedience by their own ſuperſtition. Ergamènes, who reigned in the time of Ptolemy the ſecond, and who was inſtructed in the philoſophy of the Greeks, was the firſt who had the courage to ſhake off this iniquitous and ſacerdotal yoke. Having formed a reſolution which was truly worthy of a king, he led an army againſt Meroè, where, in more ancient times, was the Ethiopian temple of gold. He put all the prieſts to the ſword, and inſtituted a new worſhip.

The friends of the king had impoſed on themſelves a very ſingular law, which was in force in the time of Diodorus Siculus. When their ſovereign had loſt the uſe of any part of his body, by malady, or by any other accident, they inflicted the ſame infirmity on themſelves; deeming it, for inſtance, ſhameful to walk ſtraight after a lame king. They thought it abſurd not to ſhare with him corporal inconveniencies; ſince we are bound by the ties of mere friendſhip to participate the misfortunes and proſperity of our friends. It was even cuſtomary among them to die with their kings, which they thought a glorious teſtimony of their conſtant loyalty. Hence the ſubjects of an Ethiopian king were very attentive to *his* and their common preſervation; and therefore, it was extremely difficult and dangerous to form a conſpiracy againſt him.

The Ethiopians had very particular ceremonies in their funerals. According to Cteſias, after having ſalted the bodies, they put them into a hollow ſtatute of gold which reſembled the deceaſed; and that ſtatue was placed in a niche on a pillar which they ſet up for that purpoſe. But it was only the remains of the richeſt Ethiopians that were thus honoured. The bodies of the next claſs were contained in ſilver ſtatues; the poor were enſhrined in ſtatues of earthen ware.

* *Lib.* iii. c. 24.

Herodotus * informs us, that the neareſt relations of the dead kept the body a year in their houſes, and offered ſacrifices and firſt-fruits during that time to their deceaſed friend; and at the end of the year, they fixed the niche in a place ſet apart for the purpoſe, near their town.

The Ethiopians made uſe of bows and arrows, darts, lances, and ſeveral other weapons, in their wars, which they managed with great ſtrength and dexterity. Circumciſion was a rite obſerved amongſt them, as well as among the Egyptians, from very early antiquity; tho' which of theſe nations firſt received it, cannot certainly be known. The Ethiopian ſoldiers tied their arrows round their heads, the feathered part of which touched their foreheads, temples, &c. and the other projected out like ſo many rays, which formed a kind of crown. Theſe arrows were extremely ſhort, pointed with ſharp ſtones inſtead of iron, and dipped in the *virus* of ſerpents, or ſome other lethiferous poiſon, inſomuch that all the wounds given by them were attended with immediate death. The bows from which they ſhot theſe arrows were four cubits long; and required ſo much ſtrength to manage them, that no other nation could make uſe of them. The Ethiopians retreated fighting, in the ſame manner as the Parthians; diſcharging vollies of arrows with ſuch dexterity and addreſs whilſt they were retiring full-ſpeed, that they terribly galled the enemy. Their lances or darts were of an immenſe ſize, which may be deemed a farther proof of their vaſt bodily ſtrength.

* *Lib.* iii. c. 24.

Thus far chiefly with regard to the Ethiopians who lived in the capital, and who inhabited the iſland of Meroe and that part of Ethiopia which was adjacent to Egypt.

There were many other Ethiopian nations, ſome of which cultivated the tracts on each ſide of the Nile, and the iſlands in the middle of it; others inhabited the provinces bordering on Arabia; and others lived more towards the centre of Africa. All theſe people, and among the reſt thoſe who were born on the banks of the river, had flat noſes, black ſkins, and woolen hair. They had a very ſavage and ferocious appearance; they were more brutal in their cuſtoms than in their nature. They were of a dry aduſt temperament; their nails in length reſembled claws: they were ignorant of the arts which poliſh the mind: their language was hardly articulate; their voices were ſhrill and piercing. As they did not endeavour to render life more commodious and agreeable, their manners and cuſtoms were very different from thoſe of other nations. When they went to battle, ſome were armed with bucklers of ox's hide, with little javelins in their hands; others carried crooked darts; others uſed the bow, and others fought with clubs. They took their wives with them to war, whom they obliged to enter upon military ſervice at a certain age. The women wore rings of copper at their lips.

Diod. Sic. p. 101.

Some of theſe people went without cloathing. Sometimes they threw about them what they happened to find, to ſhelter themſelves from the burning rays of the ſun. With regard to their food, ſome lived upon a certain fruit, which grew ſpontaneouſly in marſhy places: ſome ate the tendereſt ſhoots of trees, which were defended by the large branches from the heat of the ſun; and others ſowed Indian corn and lotos. Some of them lived only on the roots of reeds. Many ſpent a great part of their time in ſhooting birds; and as they were excellent archers, their bow ſupplied them with plenty. But the greater part of this people were ſuſtained by the fleſh of their flocks.

The people who inhabited the country above Meroe, made remarkable diſtinctions among their gods. Some, they ſaid, were of an eternal and incorruptible nature, as the ſun, the moon, and the univerſe; others, having been born among men, had acquired divine honours by their virtue, and by the good which they had done to mankind. They worſhipped Iſis, Pan, and particularly Jupiter and Hercules, from whom they ſuppoſed they had received moſt benefits. But ſome Ethiopians believed that there were no gods; and when the ſun roſe, they fled into their marſhes, execrating him as their cruelleſt enemy.

Diod. Sic. p. 102.

Theſe Ethiopians differed likewiſe from other nations in the honours which they paid to their dead. Some threw their bodies into the river, thinking that the moſt honourable ſepulture. Others kept them in their houſes in niches: thinking that their children would be ſtimulated to virtuous deeds by the ſight of their anceſtors; and that grown people, by the ſame objects, would retain their parents in their memory. Others put their dead bodies into coffins of earthen ware, and buried them near their temples. To ſwear with the hand laid upon a corpſe, was their moſt ſacred and inviolable oath.

The ſavage Ethiopians of ſome diſtricts gave their crown to him who of all their nation was beſt made. Their reaſon for that preference was, that the two firſt gifts of heaven were monarchy and a fine perſon. In other territories, they conferred the ſovereignty on the moſt vigilant ſhepherd; for he, they alleged, would be the moſt careful guardian of his ſubjects. Others choſe the richeſt man for their king; for he, they thought, would have it moſt in his power to do good to his ſubjects. Others, again, choſe the ſtrongeſt; eſteeming thoſe moſt worthy of the firſt dignity, who were ableſt to defend them in battle.

Some of the moſt remarkable of theſe ſavage nations the reader may ſee more particularly deſcribed (from the above quoted authors), at the words ACRIDOPHAGI, HYLOGONES, HYLOPHAGI, ICHTHYOPHAGI, RHIZOPHAGI, STRUTHOPHAGI, and TROGLODYTES.

The empire of Ethiopia is now called *Abyſſinia;* but very little either is or can be known concerning it, becauſe the emperors will not allow any European to enter their dominions. This is entirely owing to the jeſuit miſſionaries, who for ſome time reſided in that country. They were totally expelled about the middle of the laſt century; no doubt for very good reaſons, tho' they themſelves did not think proper to relate them. The moſt probable accounts of the preſent ſtate of Ethiopia may be ſeen under the article ABYSSINIA and AFRICA.

ETHIOPS ANTIMONIAL, MARTIAL, and MINERAL. See PHARMACY, n° 736, b. 752, 804.

ETHMOIDES OS. See ANATOMY, n° 16.

ETNA, or Mount GIBELLA, in Sicily. See ÆTNA.

ETMULLER (Michael), a moſt eminent phyſician, born at Leipſic in 1646. After having travelled through the greateſt part of Europe, he became profeſſor of botany, chemiſtry, and anatomy; at Leipſic, where he died in 1683. He was a very volumnious writer; his works making no leſs than 5 vols folio, as printed at Naples in 1728. His ſon Michael Erneſt Etmuller was alſo an ingenious phyſician, who publiſhed ſeveral pieces, and died in 1732.

ETOLIA, a country of ancient Greece, comprehending all that tract now called the *Deſpotat*, or *Little Greece*. It was parted on the eaſt by the river Evenus, now the Fidari, from the Locrenſes Ozolæ; on the weſt, from Acarnania by the Achelous; on the north, it bordered on the country of the Dorians and part of Epirus; and, on the ſouth, extended to the bay of Corinth.

The Etolians were a reſtleſs and turbulent people; ſeldom at peace among themſelves, and ever at war with their neighbours; utter ſtrangers to all ſenſe of friendſhip, or principles of honour; ready to betray their friends upon the leaſt proſpect of reaping any advantage from their treachery: in ſhort, they were looked upon by the other ſtates of Greece no otherwiſe than as outlaws and public robbers. On the other hand, they were bold and enterpriſing in war; inured to labour and hardſhips; undaunted in the greateſt dangers; jealous defenders of their liberties, for which they were, on all occaſions, willing to venture their lives, and ſacrifice all that was moſt dear to them. They diſtinguiſhed themſelves above all the other nations of Greece, in oppoſing the ambitious deſigns of the Macedonian princes; who, after having reduced moſt of the other ſtates, were forced to grant them a peace upon very honourable terms. The conſtitution of the Etolian republic was copied from that of the Achæans, and with a view to form, as it were, a counter alliance; for the Etolians bore an irreconcileable hatred to the Achæans, and had conceived no ſmall jealouſy at the growing power of that ſtate. The Cleomenic war, and that of the allies, called the *ſocial war*, were kindled by the Etolians in the heart of Peloponneſus, with no other view but to humble their antagoniſts the Achæans. In the latter, they held out, with the aſſiſtance only of the Eleans and Lacedemonians, for the ſpace of three years, againſt the united forces of Achaia and Macedon; but were obliged at laſt to purchaſe a peace, by yielding up to Philip all Acarnania. As they parted with this province much againſt their will, they watched all opportunities of wreſting it again out of the Macedonian's hands; for which reaſon they entered into an alliance with Rome againſt him, and proved of great ſervice to the Romans in their war with him: but growing inſolent upon account of their ſervices, they made war upon the Romans themſelves. By that warlike nation they were overcome, and granted a peace on the following ſevere terms: 1. The majeſty of the Roman people ſhall be revered in all Etolia. 2. Etolia ſhall not ſuffer the armies of ſuch as are at war with Rome to paſs through her territories, and the enemies of Rome ſhall be likewiſe the enemies of Etolia. 3. She ſhall, in the ſpace of 100 days, put into the hands of the magiſtrates of Corcyra all the priſoners and deſerters ſhe has, whether of the Romans or their allies, except ſuch as have been taken twice, or during her alliance with Rome. 4. The Etolians ſhall pay down in ready money, to the Roman general in Etolia, 200 Euboic talents, of the ſame value as the Athenian talents, and engage to pay 50 talents more within the ſix years following. 5. They ſhall put into the hands of the conſul 40 ſuch hoſtages as he ſhall chooſe; none of whom ſhall be under 12, or above 40, years of age: the pretor, the general of the horſe, and ſuch as have been already hoſtages at Rome, are excepted out of this number. 6. Etolia ſhall renounce all pretenſions to the cities and territories which the

Romans have conquered, though thoſe cities and territories had formerly belonged to the Etolians. 7. The city of Oenis, and its diſtrict, ſhall be ſubject to the Acarnanians.

After the conqueſt of Macedon by Paulus Æmilius, they were reduced to a much worſe condition; for not only thoſe among them, who had openly declared for Perſeus, but ſuch as were only ſuſpected to have favoured him in their hearts, were ſent to Rome, in order to clear themſelves before the ſenate. There they were detained, and never afterwards ſuffered to return into their native country. Five hundred and fifty of the chief men of the nation were barbarouſly aſſaſſinated by the partiſans of Rome, for no other crime but that of being ſuſpected to wiſh well to Perſeus. The Etolians appeared before Paulus Æmilius in mourning habits, and made loud complaints of ſuch inhuman treatment; but could obtain no redreſs: nay, ten commiſſioners, who had been ſent by the ſenate to ſettle the affairs of Greece, enacted a decree, declaring, that thoſe who were killed had ſuffered juſtly, ſince it appeared to them that they had favoured the Macedonian party. From this time thoſe only were raiſed to the chief honours and employments in the Etolian republic, who were known to prefer the intereſt of Rome to that of their country; and as theſe alone were countenanced at Rome, all the magiſtrates of Etolia were the creatures and mere tools of the Roman ſenate. In this ſtate of ſervile ſubjection they continued till the deſtruction of Corinth, and the diſſolution of the Achæan league; when Etolia, with the other free ſtates of Greece, was reduced to a Roman province, commonly called the *province of Achaia*. Nevertheleſs, each ſtate and city was governed by its own laws, under the ſuperintendency of the pretor whom Rome ſent annually into Achaia. The whole nation paid a certain tribute, and the rich were forbidden to poſſeſs lands any-where but in their own country.

In this ſtate, with little alteration, Etolia continued under the emperors, till the reign of Conſtantine the Great, who, in his new partition of the provinces of the empire, divided the weſtern parts of Greece from the reſt, calling them *New Epirus*, and ſubjecting the whole country to the *præfectus prætorii* for Illyricum. Under the ſucceſſors of Conſtantine, Greece was parcelled out into ſeveral principalities, eſpecially after the taking of Conſtantinople by the Weſtern princes. At that time, Theodorus Angelus, a noble Grecian, of the imperial family, ſeized on Etolia and Epirus. The former he left to Michael his ſon; who maintained it againſt Michael Palæologus, the firſt emperor of the Greeks, after the expulſion of the Latins. Charles, the laſt prince of this family, dying in 1430, without lawful iſſue, bequeathed Etolia to his brother's ſon, named alſo Charles; and Acarnania to his natural ſons, Memnon, Turnus, and Hercules. But, great diſputes ariſing about this diviſion, Amurath II. after the reduction of Theſſalonica, laid hold of ſo favourable an opportunity, and drove them all out in 1432. The Mahometans were afterwards diſpoſſeſſed of this country by the famous prince of Epirus, George Caſtriot, commonly called *Scanderbeg*; who, with a ſmall army, oppoſed the whole power of the Ottoman empire, and defeated thoſe barbarians in 22 pitched battles. This hero, at his death, left great part of Etolia to the Venetians; but, they not being able to make head againſt ſuch a mighty power, the whole country was ſoon reduced by Mohammed II. whoſe ſucceſſors hold it to this day.

ETYMOLOGY, that part of grammar which conſiders and explains the origin and derivation of words, in order to arrive at their firſt and primary ſignification, whence Quintilian calls it *originatio*.—The word is formed of the Greek ετυμος, *verus*, "true," and λεγω, *dico*, "I ſpeak;" whence λογια, *diſcourſe*, &c.; and thence Cicero calls the etymology, *notatio*, and *veriloquium:* though Quintilian chooſes rather to call it *originatio*.

A judicious inquiry into etymologies, is thought by ſome of conſiderable uſe; becauſe nations, who value themſelves upon their antiquity, have always looked on the antiquity of their language as one of the beſt titles they could plead; and the etymologiſt, by ſeeking the true and original reaſon of the notions and ideas fixed to each word and expreſſion, may often furniſh an argument of antiquity, from the traces remaining thereof, compared with the ancient uſes. Add, that etymologies are neceſſary for the thorough underſtanding of a language. For, to explain a term preciſely, there ſeems a neceſſity of recurring to its firſt impoſition, in order to ſpeak juſtly and ſatisfactorily thereof. The force and extent of a word is generally batter conceived when a perſon knows its origin and etymology.

It is objected, however, that the art is arbitrary, and built altogether on conjectures and appearances; and the etymologiſts are charged with deriving their words from where they pleaſe. And indeed it is no eaſy matter to go back into the ancient Britiſh and Gauliſh ages, and to follow, as it were, by the track, the various imperceptible alterations a language has undergone from age to age; and as thoſe alterations have ſometimes been merely owing to caprice, it is eaſy to take a mere imagination or conjecture for a regular analogy: ſo that it is no wonder the public ſhould be prejudiſed againſt a ſcience which ſeems to ſtand on ſo precarious a footing. It muſt certainly be owned, that etymologies are frequently ſo far fetched, that one can ſcarce ſee any reſemblance or correſpondence therein. Quintilian has ſhewn, that the ancient etymologiſts, notwithſtanding all their learning, fell into very ridiculous derivations.

The etymologies of our Engliſh words have been derived from the Saxon, Welch, Walloon, Daniſh, Latin, Greek, &c.

In this work the etymologies of terms are generally noted, where their obviouſneſs does not render it unneſſary, or their dubiety or unimportance uſeleſs.

EVACUANTS, in pharmacy, are properly ſuch medicines as diminiſh the animal fluids, by throwing out ſome morbid or redundant humour; or ſuch as thin, attenuate, and promote the motion and circulation thereof.

EVACUATION, in medicine, the art of diminiſhing, emptying, or attenuating, the humours of the body.

EVAGRIUS SCHOLASTICUS, a famous hiſtorian, born at Epiphania, about the year 536. He practiſed the profeſſion of an advocate, from which he was called *Scholiaſticus*, which name was then given to the pleaders at the bar. He was alſo tribune and keeper of the prefect's diſpatches. He wrote an eccleſiaſtical hiſtory, which begins where Socrates and Theodoret ended theirs; and other works, for which he was rewarded by the emperors Tiberius and Mauricius. M. de Valois publiſhed at Paris a good edition of Evagrius's eccleſiaſtical hiſtory, in folio; and it was republiſhed at Cambridge in 1620, in folio, by William Reading, with additional notes of various authors.

EVANGELIST, a general name given to thoſe who write or preach the goſpel of Jeſus Chriſt.

The word is of Greek origin, ſignifying one who publiſhes glad tidings, or is the meſſenger of good news.

According to Hooker, evangeliſts were preſbyters of principal ſufficiency, whom the apoſtles ſent abroad, and uſed as agents in eccleſiaſtical affairs, whereſoever they ſaw need.

The term *evangeliſt*, however, is at preſent confined to the writers of the four goſpels.

EVANID, a name given by ſome authors to ſuch colours as are of no long duration, as thoſe in the rainbow, in clouds before and after ſun-ſet, &c.

Evanid colours are alſo called *fantaſtical* and *emphatical* colours.

EVANDER, a famous Arcadian chief, called the ſon of Mercury, on account of his eloquence, bought a colony of his people into Italy, about ſixty years before the taking of Troy; when Faunus, who then reigned over the Aborigines, gave him a large extent of country, in which he ſettled with his friends. He is ſaid to have taught the Latins the uſe of letters, and the art of huſbandry.

EVANTES, in antiquity, the prieſteſſes of Bacchus, thus called, by reaſon, that in celebrating the orgia, they ran about as if diſtracted, crying, *Evan, evan, ohé evan*. See BACCHANALIA.

EVAPORATION, in natural philoſophy, is the diſſipation of the parts of any ſubſtance either ſolid or fluid into the air, in the form of ſmoke, or otherwiſe, in an inviſible manner, ſo that the ſubſtance evaporated then forms a fluid of equal ſubtilty and tranſparency with air itſelf.

When any ſubſtance is diſſipated ſlowly and inſenſibly by ſimple expoſure to the atmoſphere, as water, camphor, &c. the evaporation is ſaid to be *ſpontaneous*.

Evaporation, in all caſes, is greatly promoted by heat. Many ſubſtances may be made to evaporate by means of a ſtrong fire, which otherwiſe appear abſolutely fixed; and there are but few which can reſiſt the violent action of the focus of a large burning mirror, without being in great part diſſipated.

1
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ids boil.

The degree of heat in which different bodies begin ſenſibly to evaporate is very different. When fluids of all kinds have been heated to a certain degree, their evaporation is attended with great inteſtine motion called *boiling*: and as then the diſſipation becomes much more ſenſible than before, this degree of heat is called their *evaporific point*; but improperly, for they begin ſenſibly to evaporate long before.

The boiling point of all fluids is by no means the ſame; and the degree of heat which would cauſe the moſt fuſible metal to boil, is prodigiouſly greater than what would diſſipate the moſt fixed and ponderous fluid with the utmoſt rapidity. Vitriolic, and eſpecially nitrous ether, boil with a heat very little greater than that of our atmoſphere in ſummer. Spirit of wine requires Fahrenheit's thermometer to be raiſed 175 degrees above 0, before it boils; water requires 212 of the ſame degrees; oil of vitriol 550, oil of turpentine 560, quickſilver and linſeed oil 600, before they boil.

The quantity of any ſubſtance evaporated is found to depend ſo much on the degree of heat applied to it, that heat alone is generally reckoned to be the ſole cauſe of evaporation. Many perplexing circumſtances, however, occur, when we attempt to explain the manner in which a body, water for inſtance, naturally 800 times heavier than air, ſhould become ſo much ſpecifically lighter, as to be carried up by it to a very conſiderable height. One of the moſt generally received opinions concerning the formation of vapour is that adopted by Dr Halley. He ſuppoſes that a bubble, compoſed of a particle of air incloſed by a thin film of water is rarefied by heat to ſuch a degree, that it becomes ſpecifically lighter than common air; in conſequence of which, ſuch particles, whatever be their number, muſt aſcend, and be ſuſpended in the air when they arrive at ſuch an height as to find the atmoſphere preciſely of the ſame ſpecific gravity with themſelves. But many objections may be made to ſuch a theory. For though a great quantity of air is diſperſed in water, it is not eaſy to account for the formation of a bubble diſtinct from the maſs of water; nor, though we could account for this, ought it to be taken for granted without ſufficient proof; and it remains to be explained by what means theſe bubbles would aſcend into the air; becauſe, by reaſon of their extreme ſmall ſize, the cold of the external air would almoſt inſtantly reduce the rarefied air-bubble to the ſame ſpecific gravity with itſelf. The bubble would then become ſpecifically heavier than the atmoſphere, and immediatelly fall down; ſo that vapour, inſtead of riſing to the height of two or three miles, could ſcarce riſe to the height of as many feet.

2
Dr Halley's theory of evaporation.

3
Another by Dr Deſaguliers.

Another theory, from the expanſion of water, is adopted by Dr Deſaguliers, who reaſons as follows: "Water is expanded by heat; and ſuppoſing it to be expanded to a bulk more than 800 times greater than in its uſual ſtate, it becomes ſpecifically lighter than common air, and muſt conſequently riſe in it till it meet with air above its own degree of rarefaction." To illuſtrate this, he obſerves, that boiling water, when it becomes vapour, is expanded to a bulk 14,000 times greater than when cold; and to account for evaporation in the ordinary heat of our atmoſphere, he takes it for granted, that the degree of expanſion is ſtrictly proportioned to the degree of heat; from which he calculates thus. "In Sir Iſaac Newton's ſcale, the heat of boiling water is 34; the mean heat of ſummer, 5; the mean heat of ſpring and autumn, 3; and the mean heat of winter, 2. Therefore, if the expanſion of water by 34 degrees of heat be 14,000, the expanſion by 5 degrees will be 2,058; by 3 degrees 1,235; and by 2, the mean heat of winter, it will be 823; which is ſufficient to raiſe vapour, the uſual denſity of which is to that of air as 800 to 1.

This theory is liable to the ſame objections with the former, and indeed to much greater: For if, even by the heat of winter, water is expanded ſo much that it becomes ſpecifically lighter than air, by what force is it kept below, contrary to the laws of gravity? Or, ſuppoſing it once lodged in the air; how is it to be kept there; ſeeing the ſuperior air muſt very ſoon reſtore it to the ſame degree of heat with itſelf; upon which it muſt immediately deſcend?

4 Lord Kaims's and Profeſſor Hamilton's theory.

To avoid the difficulties to which the abovementioned theories are liable, another hath been publiſhed by lord Kaims and profeſſor Hamilton. They account for evaporation on the principle of elective attraction, and then ſolve the natural phenomena in the following manner. 1. "By an elective attraction between air and water, there is always a quantity of air in water and of water in air. 2. When water is ſaturated with air, it will take up no more; and, in like manner, air ſaturated with water attracts no more. 3. This power of elective attraction is augmented by heat; for after air is ſaturated with water, or water with air, they will attract more by increaſing their heat. 4. The air with its moiſture being rarefied by heat, aſcends to a higher region, giving place to purer air not yet ſaturated, which accordingly attracts more moiſture, and water by that means is diffuſed thro' the air. 5. The groſſer particles of water, ſwimming in the air, being accumulated by wind, eſpecially contrary winds, become viſible clouds, and fall down in rain by the force of gravity overcoming the elective attraction. 6. Cold alſo contributes its part, by condenſing the watery particles, which fall down in ſnow when the cold is violent; and by theſe means a conſtant circulation of moiſture is carried on."

This hypotheſis is alſo liable to be overthrown: for, according to it, evaporation ought not to take place *in vacuo;* which is contrary to experience.—The anſwer given by lord Kaims to this objection is a denial of the fact. Profeſſor Hamilton owns the diſſipation of water by heat *in vacuo;* but denies that this is really evaporation, which he maintains to be a true ſolution of water in air; and as a proof of this, he put ſome water well purged of air under the exhauſted receiver of an air-pump, and found that it loſt only 2¼ grains in the ſame time that an equal quantity expoſed to the air loſt 35 grains.

5 Mr Watt's experiment concerning the evaporation of water *in vacuo.*

That water can be converted into ſteam *in vacuo,* cannot be denied without the greateſt ſcepticiſm. It is even found much more eaſily diſſipated *in vacuo* than when expoſed to the open air, and boils with much leſs heat; 92 or 95 degrees being ſufficient to make water boil *in vacuo,* whereas it requires 212° to make it boil when expoſed to the air. Concerning this, Dr Black relates the following experiment.

Mr Watt of Glaſgow, having formed a project of performing the evaporation of water *in vacuo,* with a view to convert it into ſteam with leſs expence of fuel, communicated his ſcheme to the doctor. The experiment was made with a ſmall ſtill reſembling the body of a retort, with a veſſel ſerving as a condenſer. The whole apparatus was cloſe, except a little hole at the extremity of the condenſing veſſel. Into this diſtilling veſſel a quantity of water was put: it was then exhauſted of air, by taking the condenſing veſſel, and holding it up, that the retort might be undermoſt. Being held over the fire in this poſition, the whole was ſoon filled with ſteam, which expelled the air; and upon ſtopping the little hole, a pretty perfect vacuum was formed in the retort and condenſing veſſel. The diſtilling veſſel being then ſet upon the fire, and the condenſing veſſel plunged in cold water, the water in the ſtill began to boil, as might be known by the noiſe, with a degree of heat very little greater than that of the human body, and the ſteam came over, and was condenſed in the refrigeratory; but Mr Watt obſerved that the evaporation was not quicker *in vacuo,* than when air was admitted.

6 Profeſſor Hamilton's experiments inconcluſive.

Thus we ſee that water may be converted into ſteam by the effect of heat alone, without the aſſiſtance of air; and thus the hypotheſis of lord Kaims falls to the ground. Profeſſor Hamilton's experiment is evidently inconcluſive, becauſe it does not appear to have been fairly made. He put a certain quantity of water under an exhauſted receiver for 24 hours, and expoſed an equal quantity to the air in the ſame room; the firſt loſt 2½ grains, the latter 35. From this we can conclude nothing but that the quantity of fluid, whatever it is, which remains after the receiver of an air-pump is exhauſted, is capable of taking up 2½ grains of water. As no more of this fluid could be admitted to the water, than the preciſe quantity contained in the receiver, it is plain, that the other quantity of water which was expoſed to the open air of a room, ought to have been included within a receiver of the ſame ſize with the firſt, from which the air was not exhauſted: for in the manner wherein this experiment was conducted, an immenſe quantity of air had acceſs to one veſſel, and only as much as could be contained in the receiver of an air-pump, of the medium remaining after the air is exhauſted, had acceſs to the other; ſo that it would have been very abſurd to expect the ſame reſult in both caſes. Even circumſtanced as the experiment is, it makes directly againſt that hypotheſis which the profeſſor is deſirous of ſupporting; for, as the air-pump he made uſe of was capable of rarefying the air two and forty times, had the evaporation depended on the ſmall quantity of air which was left in the receiver, only the two and fortieth part ought to have been diſſipated of what would have been loſt had the water been placed under a receiver full of air. Inſtead of this, a like quantity of water expoſed to the air contained in a large room, loſt only 14 times as much. Had the vacuum of the receiver been as large as the room, it is impoſſible to ſay how much would have been loſt; and the only concluſion we can draw is, that the air, however neceſſary to the aſcent of vapour, is in reality prejudicial to its firſt formation.

7 Cold produced by evaporation.

A very remarkable circumſtance concerning the evaporation of fluids is, that ſome degree of cold is always produced in conſequence of it; and by means of ſome of the more volatile ones, a great degree of cold is produced. If ſome vitriolic ether is put into a vial, ſet in a ſmall veſſel of water, and the whole placed under an air-pump, the ether boils violently as ſoon as the air is exhauſted, while the water is frozen by the cold produced in conſequence of its evaporation. This circumſtance hath been made uſe of as a proof that evaporation is not occaſioned by heat; and the ſenſible coldneſs of vapour has been thought a demonſtration that heat could by no means be concerned in its formation. Dr Black, however, who treats particularly ly of the formation of vapour, hath accounted for this in a very ſatisfactory manner; and gives heat, in a certain degree, as the cauſe of evaporation in all caſes whatever.

8 Dr Black's account of ſenſible and latent heat.

This gentleman is of opinion, that all fluid ſubſtances, beſides the heat contained in them capable of affecting our ſenſes or a thermometer, contain a certain quantity united to them in ſuch a manner as not to be diſcoverable by either of theſe methods; which, however, on certain occaſions, is apt to break forth, and ſhew its proper qualities as heat or fire. Theſe two different ſtates of this fluid, he diſtinguiſhes by the names of *ſenſible* and *latent* heat.—A proof that heat exiſts in this latent ſtate, he gives from a mixture of ice with hot water. He obſerves, that, when two equal maſſes of the ſame matter heated to different degrees, are mixed together, the heat of the mixture ought to be an arithmetical mean betwixt the two extremes. But, on pouring hot water upon ice, he found the caſe to be conſiderably different, and that a quantity of heat was entirely loſt; which he could account for in no other manner than by ſuppoſing, that it entered into the compoſition of the water, in ſuch a manner as to be in a latent ſtate, and the inviſible cauſe of the fluidity of that element. (See FLUIDITY).

9 Of the formation of vapour.

What happened in this caſe, to a mixture of ice and water, the doctor thinks, always happens on the converſion of water into ſteam or vapour by means of heat: a great quantity of the heat thrown into the fluid enters into it when in the ſtate of vapour, and forms a part of the fluid itſelf; in which ſtate it is not diſcoverable either by the thermometer or by the touch, but yet is ready to appear again in its proper form when the vapour is condenſed.

The moſt concluſive experiments, mentioned by Dr Black, as a proof of this theory, are, that hot water put under the exhauſted receiver of an air-pump boils with great violence, and a part of it is ſuddenly diſperſed in vapour. During this time the water itſelf cools remarkably faſt, a part of the heat diſappears, and is neither to be found in the ſteam nor in the water. What then has become of it? The doctor concludes it ſtill exiſts in the ſteam, though in a latent ſtate, and not to be diſcovered by the common methods.

In this manner, likewiſe, he accounts for the abovementioned experiment of the water freezing under an exhauſted receiver, in conſequence of the evaporation of the ether.—This fluid being ſo extremely volatile that it went off in vapour when the temperature of the air was only 50°, abſorbed the ſenſible heat of the ſurrounding water, which entered into the compoſition of the etherial vapour, and there remained in a latent ſtate. Certain it is, that, in this experiment, there was no perceptible increaſe of heat either in the ether or its vapour; the water indeed loſt heat conſiderably, but neither of theſe gained it.

The element of fire, however, is ſo exceedingly ſubtile, and ſo much eludes our moſt diligent ſearch, that we cannot conclude from its diſappearance in one place, that it has imperceptibly occupied another; the doctor, therefore, has yet a ſtronger argument in favour of his theory. He maintains, that, in the condenſation of ſteam by the refrigeratory of a common ſtill, as much heat is communicated to the water in the refrigeratory as would be ſufficient to heat the water which comes over to the heat of red-hot iron, were it all to exiſt in it in the form of ſenſible heat. Nevertheleſs, the ſteam is at no time hotter than the boiling water which emits it. The exceſs of heat, therefore, muſt have exiſted in the ſteam in a latent ſtate, and become ſenſible during the condenſation.

The method of calculating this quantity of heat is very eaſy. For, ſuppoſing the refrigeratory to contain 100 pounds of water, and that one pound has been diſtilled: If the water in the refrigeratory has received 10 degrees of heat during the diſtillation, we know that the one pound diſtilled has parted with 1000. If, in paſſing through the worm of the refrigeratory, it has been reduced to the temperature of 50° of Fahrenheit's; having been at 212 when it entered the worm in form of ſteam, it has loſt only 162° of ſenſible heat; all the reſt of that heat which it communicated to the refrigeratory, amounting to above 800°, was contained in it while in the form of ſteam, in ſuch a ſtate as not to be indicated by the thermometer.

By calculating in this manner, the doctor generally found, that the heat communicated by the ſteam was about 800 degrees; which would have been ſufficient to render a maſs of iron equal in bulk to the water which came over, red-hot. In the experiment made by Mr Watt, no leſs than 1000 degrees were communicated; though, all the time, the ſteam came over with a very gentle heat, but little ſuperior to what the hand could bear.

This experiment, no doubt, unanſwerably confirms the doctor's theory of heat. It is proper, however, to take notice, that a deception may very eaſily take place with ſuch as repeat the experiment in a careleſs manner.—The upper part of the water in a refrigeratory grows very hot, while the under part is quite cold; and if a thermometer is plunged into it without ſtirring the water, a much greater degree of heat will be thought to be communicated than really there is. To avoid this miſtake, it is neceſſary to ſtir the water well about, and then meaſure its degree of heat.

This theory of *ſenſible* and *latent* heat, ſo well eſtabliſhed, cannot but be looked upon as a valuable diſcovery in natural philoſophy; and will enable us to give a more ſatisfactory account of the formation of vapour when ſtrong degrees of heat are applied, as well as in the common heat of our atmoſphere, than any that hath hitherto been publiſhed. We ſhall begin with the converſion of any fluid, water, for inſtance, into vapour, when ſuch a degree of heat is applied as to make it boil.

10 How boiling water is converted into ſteam.

Here, the water has already received the utmoſt degree of heat which it is capable of containing. When a larger quantity continues ſtill to be thrown in, it muſt either paſs through the ſubſtance of the water and be diſſipated in the air, or combine with the aqueous particles in the form of ſteam. That the extreme agility of heat cauſes great part of it to paſs through the water and be loſt, cannot be denied; but it is alſo evident, that a very conſiderable part combines with the ſubſtance of the water, and is converted into vapour. The action of boiling conſiſts in the aſcent of a great number of bubbles from the bottom of the veſſel containing the water. Theſe, growing continually larger as they aſcend, break on the ſurface of the water, and are

are found to be compoſed of ſteam or vapour *. As they continue till the evaporation of the very laſt drop of water, long after it has parted with all its air, this cannot be ſuppoſed to have any ſhare in their formation. Indeed, Dr Boerhaave and others have proved, that there is no air contained in them; and both Dr Black and Profeſſor Hamilton have ſhewn, that they are the very fluid which is diſſipated in the form of ſmoke. If, therefore, ſteam exiſts, and appears in its own proper form, when the air has no acceſs to it, which it has not till the bubble aſcends to the top and breaks in the air, it is impoſſible that air can have a ſhare in its formation; though by its ſuperior gravity it is the ſole cauſe of its aſcent.

If we are inclined, then, to call vapour a ſolution of water in any thing, it muſt be in heat, or fire; ſeeing, according to profeſſor Hamilton himſelf, it appears in the proper form of vapour before it has had any connection with the air.

11
Spontaneous evaporation accounted for.

Upon the ſame principles we may eaſily account for the ſpontaneous or inſenſible evaporation of water when a degree of heat much leſs than that requiſite to cauſe it boil is applied to it. From Dr Black's experiments it appears *, that a certain degree of heat is neceſſary to keep it in a fluid ſtate; and whatſoever degree is applied to it ſuperior to that abſolutely neceſſary to keep it fluid, appears to be but looſely connected with it, ſo that the water will very readily part with this ſuperfluous degree of heat to any colder body that comes in contact with it. Water in its fluid ſtate, then, we may conſider as a kind of compound, conſiſting of the pure element, and a certain quantity of heat ſo looſely combined with it as to affect the thermometer; but it is impoſſible that two ſubſtances having a tendency to mutual union can fail to be united in the cloſeſt manner of which they are capable when brought very near or in contact with each other. The water, therefore, having a conſtant tendency to abſorb the ſenſible heat, and convert it into latent heat, muſt continue to do ſo more or leſs ſlowly according to the quantity contained in it. By this means there is a proportional quantity of vapour formed; for we muſt remember, that when heat and water are combined in the moſt intimate manner, they form a new ſubſtance totally different from water in its elementary ſtate. The particles of vapour thus formed, muſt neceſſarily aſcend to the ſurface of the water, and thence into the air, for the reaſons already mentioned; and thus there will be a conſtant exhalation from the ſurface of water, when the atmoſphere is of ſuch a temperature as to keep it fluid.

12
Why there is an evaporation from ice.

It now remains to account for the evaporation of water from ice; when the atmoſphere is of ſuch a nature as to deprive the water of great part of its ſenſible heat, and reduce it to a ſolid form. From a very curious experiment *, Dr Black hath ſhewn, that, in the act of freezing, the latent heat of the water is called forth, and becomes ſenſible. The ice, therefore, during the proceſs of congelation, is always a little warmer than the external air. In this caſe then, with regard to the external atmoſphere, it may be conſidered as ſimilar to water having a ſmall fire under it, ſo as to make it a degree or two warmer than the ſurrounding atmoſphere. The conſequence of this would be, that the freezing water would communicate part of its ſenſible heat to the air, and another part would intimately combine with the aqueous particles, and form a vapour which would be carried up into the atmoſphere. In like manner, the piece of ice, having a degree of ſenſible heat ſuperior to that of the air, will communicate to it part of that heat; while another part, from its ſtrong tendency to unite with the water, will undoubtedly do ſo in its paſſage from the ice into the air, and carry off part of the aqueous particles in an imperceptible vapour.

Thus, according to Dr Black's theory, whether the degree of heat contained in the atmoſphere is greater or leſs than that of water, there muſt be a continual evaporation of that fluid. There is only one caſe, upon his principles, where the evaporation muſt be little or nothing; and that is, when a piece of ice is in the action of melting. Here the water indeed receives heat from the atmoſphere: but as faſt as it is received, it paſſes from a ſenſible into a latent ſtate; and, till the water is ſaturated with latent heat, very little ſenſible heat can combine with the aqueous particles, ſo as to form them into ſteam. In this inſtance likewiſe, the Doctor's theory is verified by experience; for profeſſor Hamilton having incloſed a piece of ice, while thawing, in an exhauſted receiver, and likewiſe in one full of air, found that it loſt nothing by evaporation in 24 hours.

13
Evaporation promoted by electricity.

From ſome experiments made by the Abbe Nollet, it appears, that evaporation is promoted by electricity. The conſequences of his experiments are as follow.

1. Electricity augments the natural evaporation of fluids; all that were tried, except mercury and oil, were found to ſuffer a diminution greater than what could be aſcribed to any other cauſe.

2. Electricity augments the evaporation of thoſe fluids the moſt, which are moſt ſubject to evaporate of themſelves; the volatile ſpirit of ſal ammoniac, ſuffering a greater loſs than ſpirit of wine or oil of turpentine, theſe two more than common water, and water more than vinegar or the ſolution of nitre.

3. The effects ſeemed always to be greater when the veſſels containing the fluids were non-electrics.

4. The increaſed evaporation was more conſiderable when the veſſel which contained the liquor was more open; but the effects did not increaſe in proportion to the apertures.

5. Electricity was alſo found to increaſe the evaporation of moiſture from ſolid bodies, and of conſequence to increaſe the inſenſible perſpiration of animals *.

As the electric fluid is generally thought to be the ſame with the element of fire, it cannot be thought that this diſcovery can be any objection to Dr Black's theory of the formation of vapour, but muſt rather tend to confirm it; as the phenomena of electricity preſent us with fire in a ſtate wherein it has no ſenſible heat, and which, agreeable to the Doctor's mode of expreſſion, may very properly be called its *latent ſtate*. The very great readineſs which this fluid ſhews to be converted into actual fire, ſo as even to fuſe metals, may alſo be reckoned a kind of demonſtration of the facility wherewith the ſenſible heat of any body may become latent, or the latent heat ſenſible.

Evaporation by means of heat, is one of the capital operations in chemiſtry; and where very great quantities of water are to be diſſipated, as in the making of common ſalt and green vitriol, it is a matter of no ſmall conſequence to contrive the evaporating veſſels in ſuch a manner as to diſſipate a large quantity of liquid in a ſhort time, and with little fuel. In the warmer countries, ſalt is made by the heat of the ſun alone; and even in the ſouthern parts of England, the heat of the ſolar rays is advantageouſly uſed to concentrate the brine ‡. This, however, can be but very ſeldom practiſed, and artificial evaporation is almoſt the only kind made uſe of in this country. The two great requiſites for promoting this, are, a ſufficient degree of heat to form a large quantity of ſteam, and a current of air to carry it off; for, though the vapour is always formed by the heat, yet if the air ſtagnates on the ſurface of the fluid, that part next the ſurface is heated to ſuch a degree, and ſo loaded with ſmoke, that the ſucceeding quantities of vapour are very conſiderably retarded in their aſcent. For this reaſon, evaporation is greatly promoted by having as large a ſurface of fluid expoſed to the air as poſſible, that the aſcent may be very quick; and where it is poſſible to procure a conſiderable blaſt of air along the ſurface of the veſſel containing the fluid, it will very much accelerate the diſſipation of it. On the ſame account, blowing air through the water while evaporating, increaſes the quantity of vapour to a ſurpriſing degree. It is obvious, however, that, by either of theſe methods, only time can be ſaved: for as the blaſt of cold air, whether directed along the ſurface of the fluid, or into its ſubſtance, will diminiſh the heat conſiderably; though the evaporation goes on very faſt, yet a proportionable quantity of fuel will be required; and it is doubful whether this method might in the end be attended with all the advantages promiſed by it at firſt view.

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* See *Boiling*.

* See *Congelation*, and *Fluidity*.

* See *Congelation*.

* See *Electricity*.

‡ See *Salt.*

14 Methods of evaporating great quantities of liquid in a ſhort time.

Broad ſhallow veſſels have likewiſe been found greatly to contribute to the quickneſs of evaporation, and thought to leſſen the expence of fuel. That they do accelerate the aſcent of the vapour is certain, becauſe the air has more free acceſs to the fluid than in a deeper veſſel; but it is by no means clear that the quantity of fuel is thus leſſened: on the contrary, there is great reaſon to ſuſpect, that a conſiderably larger proportion of fuel muſt be employed to evaporate an equal quantity of fluid in a wide ſhallow veſſel, than in a deeper one. They have moreover this great inconvenience, that, if their ſize be very large, it is in a manner impoſſible to make the fire act equally on the bottom of them; and the great expence attending the making of theſe kind of veſſels, together with the danger of the fluid being mixed with accidental impurities from their wide-extended ſurface, forbids their uſe, except on particular occaſions.

15 lts diſſi-ted by ry quick apora-n.

One great objection, however, to quick evaporation in any kind of veſſel is, that this proceſs is carried on for the ſake of the reſiduum; and if the liquor is made to boil with great violence, part of this reſiduum will be carried away and diſſipated in the air: what remains alſo will often be conſiderably different from what it would have been had the proceſs been conducted in a ſlow and gentle manner. Vitriolated tartar is remarkably affected by quick evaporation. Neuman relates, that by ſtrong continued boiling, it may be almoſt entirely diſſipated along with the ſteam; and yet this ſalt, the moſt ponderous of all others, is compoſed of a very fixed acid, *viz.* the vitriolic, and a fixed alkali.

To obviate this inconvenience, chemical evaporations are generally ordered to be performed with a very gentle heat; by which means the diſſipation of the ſaline matter is in a great meaſure, though not totally, prevented; for this ſeems ſomehow to depend on the action of the air. The great length of time, however, which this takes up, and the difficulty of preſerving the liquid from accidental impurities, render evaporations in this manner ſufficiently diſagreeable.

A very ſtrange difficulty occurs in attempting evaporations in this manner. If a ſaline ſolution is put into any kind of veſſel wider at top than at bottom, and ſet to evaporate with a heat below what is ſufficient to make it boil, the ſalt ſeems to diſengage itſelf from the water, and aſcends along the ſides of the evaporating veſſel in the form of a ring, which grows gradually higher and higher, till it comes to the top: it will then deſcend on the other ſide of the veſſel, till it has got low enough to form a kind of ſyphon, from whence a great part of the ſolution will be inſenſibly drained off and loſt: neither is there a poſſibility of preventing this ſaline concretion; for though you put it down ever ſo often, it very ſoon forms again. To remedy this inconvenience, Dr Black recommends the uſe of evaporating veſſels wider at bottom than at the top; where ſome quantity of vapour would always be condenſing and running down their ſides, ſo as to diſſolve the ſaline ring as ſoon as it began to form. It is evident, however, that by this method the evaporation would be rendered ſtill ſlower than before.

16 Diſtillation the beſt method of evaporating.

On many accounts, diſtillation ſeems to be the moſt advantageous method of evaporating fluids, particularly as it both prevents any of the ſalts they may contain from being diſſipated, and ſeems to be the method by which the largeſt quantities of liquid can be evaporated in the ſhorteſt time, and with leaſt fuel. It is well known, that water in a ſtill, or any covered veſſel, can be kept boiling with much leſs heat than an equal quantity in an uncovered veſſel. As the quantity of ſteam is the ſame that ariſes from an equal ſurface of water where the heat is the ſame, whether the veſſel is covered or uncovered; it follows, that if proper vent is given to the ſteam in a covered veſſel, an equal quantity will be raiſed in a cloſe veſſel with leſs fuel than in an open one; and, with an equal quantity of fuel, much more might be evaporated, in the ſame time, in a cloſe than in an open veſſel. This ſeems confirmed by what Dr Hales has advanced in his experiments concerning the freſhening of ſea-water. He has found, that, by blowing air through the water contained in a ſtill, it is made to yield double the quantity which it otherwiſe would do. By this method, he obſerves, a ſtill which holds 20 gallons, will yield, in 20 hours, 240 gallons of diſtilled water; and one which holds only five gallons, may be made to diſtil 64, in the ſame time. Theſe are prodigious quantities; and which, we believe, could not be made to ariſe in an equal time from open veſſels of the ſame ſize, by any manœuvre whatever. Even deducting one half for the action of the bellows, the quantity is exceedingly great, being upwards of a gallon and an half per hour from a veſſel holding only five gallons; and how difficult it would be to make this quantity ariſe from an open veſſel of ſuch a ſize, thoſe who are much concerned in evaporation will eaſily know. See *Diſtillation*,

ſtillation under Chemistry, nº 75.

EVATES, a branch or diviſion of the druids, or ancient Celtic philoſophers. Strabo divides the Britiſh and Gauliſh philoſophers into three ſects; bards, evates, and druids. He adds, that the bards were the poets and muſicians; the evates, the prieſts and naturaliſts; and the druids were moraliſts as well as naturaliſts: But Marcellus and Hornius reduce them all to two ſects, *viz.* the Bards and Druids.

EUBAGES, an order of prieſts, or philoſophers, among the ancient Celtæ or Gauls: ſome will have the eubages to be the ſame with the druids and ſaronidæ of Diodorus; and others, that they were the ſame with what Strabo calls Evates.

EUCHARIST, the ſacrament of the Lord's ſupper, properly ſignifies *giving thanks.*—The word in its original Greek, Ευχαριϛια, literally imports *thankſgiving;* being formed of ευ, *bene,* "well," and χαριν, *gratia,* "thanks."

This ſacrament was inſtituted by Chriſt himſelf, and the participation of it is called *communion.*

As to the manner of celebrating the euchariſt among the ancient Chriſtians, after the cuſtomary oblations were made, the deacon brought water to the biſhops and preſbyters, ſtanding round the table, to waſh their hands; according to that of the pſalmiſt, "I will waſh my hands in innocency, and ſo will I compaſs thy altar, O Lord." Then the deacon cried out aloud, "Mutually embrace and kiſs each other;" which being done, the whole congregation prayed for the univerſal peace and welfare of the church, for the tranquillity and repoſe of the world, for the proſperity of the age, for wholeſome weather, and for all ranks and degrees of men. After this followed mutual ſalutations of the miniſter and people; and then the biſhop or preſbyter having ſanctified the elements by a ſolemn benediction, he brake the bread, and delivered it to the deacon, who diſtributed it to the communicants, and after that the cup. Their ſacramental wine was uſually diluted or mixed with water. During the time of adminiſtration, they ſang hymns and pſalms; and, having concluded with prayer and thankſgiving, the people ſaluted each other with a kiſs of peace, and ſo the aſſembly broke up.

EUCLID *of* Megara, a celebrated philoſopher and logician, flouriſhed about 400 B. C. The Athenians having prohibited the Megarians from entering their city on pain of death, this philoſopher diſguiſed himſelf in womens clothes to attend the lectures of Socrates. After the death of Socrates, Plato and other philoſophers went to Euclid at Megara, to ſhelter themſelves from the tyrants who governed Athens. Euclid admitted but one chief good; which he ſometimes called *God,* ſometimes *Spirit,* and ſometimes *Providence.*

Euclid *of Alexandria,* the celebrated mathematician, flouriſhed in the reign of Ptolemy Lagus, about 277 B. C. He reduced all the fundamental principles of pure mathematics, which had been delivered down by Thales, Pythagoras, Eudoxus, and other mathematicians before him, into regularity and order, and added many others of his own diſcovering; on which account he is ſaid to be the firſt who reduced arithmetick and geometry into the form of a ſcience. He likewiſe applied himſelf to the ſtudy of mixed mathematics, and eſpecially to aſtronomy, in which he alſo excelled. The moſt celebrated of his works is his Elements of Geometry, of which there have been a great number of editions in all languages; and a fine edition of all his works was printed in 1703, by David Gregory, Savilian profeſſor of aſtronomy at Oxford.

EUDIOMETER, an inſtrument for trying the ſalubrity of air, founded on a fact diſcovered by Dr Prieſtley; namely, that nitrous air diminiſhes the bulk of common atmoſpherical air in proportion to the ſalubrity of the latter *.—The Abbe Fontana and Chevalier Landriani, were the firſt, as it ſeems, who availed themſelves of this diſcovery. Both propoſed to the public an inſtrument for meaſuring the ſalubrity of the air we breathe. They gave to theſe inſtruments, called *eudiometers,* different forms, as appears by the printed deſcriptions that each of them has ſeparately publiſhed: and the chevalier Landriani tranſmitted to England, as a preſent to Dr Prieſtley, the very inſtrument he had made uſe of to eſtimate the reſpective ſalubrity of the air in different parts of Italy. This eudiometer conſiſts of a glaſs tube, ground to a cylindrical veſſel, with two glaſs cocks, and a ſmall baſon, all fitted in a wooden frame. Quickſilver is there uſed inſtead of water; and that part of it which replaces the bulk loſt by the diminution of the two mixed airs, is conducted either through a kind of glaſs ſiphon, or through the capillary holes of a glaſs funnel: ſo that, by its fall, the whole mixture of the two kinds of air is more readily made. Dr Falconer of Bath ſent, ſome time ago, to the royal ſociety of London, a glaſs tube, neatly divided; by means of which one may be enabled to know the quantity of diminution produced in a certain bulk of the mixture of nitrous air with another air, in order to judge of its ſalubrity, which Dr Prieſtley has ſhewn to be in proportion to the diminution ſuffered in the ſum of their original bulk, after they are mixed together. This method is the readieſt of all, when no great nicety is required in obſervations of this kind; but, in order to determine this matter with the greateſt exactneſs, others have been contrived by J. H. De Magellan, F. R. S. of which he gives the following deſcription in his letter to Dr Prieſtley. "Of the three eudiometers I have contrived, which are repreſented fig. 8. 15. and 16 *. I think the latter is the eaſieſt in its application, and the moſt exact in its reſults. It is repreſented alſo (fig. 12. 14. and 17.) in different poſitions, for the better underſtanding of its application: and it conſiſts of the following parts, *viz.* a glaſs tube *m n e d,* fig. 16. about 12 or 15 inches long, and of an equal diameter; with a ground glaſs-ſtopple *m;* a veſſel *c,* the neck of which is ground air-tight to the lower end *d* of the tube; and two equal phials *a* and *b,* whoſe necks are alſo ground air-tight to the reſpective mouths of the veſſel *c.* Both theſe phials contain nearly as much as the whole tube *m n e d.* There is, moreover, a ſliding braſs-ring, marked *z,* which ſlides in the tube *n d,* and may be made tight at pleaſure by a finger-ſcrew; and, laſtly, a ruler, either of braſs or of wood, repreſented fig. 11. which is divided into equal parts, and indicates the contents of both the phials *a* and *b,* when thrown into the tube, by the number of parts which is engraved or ſtamped about the middle of it. The two bent-pieces of braſs *z t* ſerve to hold it eaſily by the ſide of the tube *n d* fig.

1 Landriani's eudiometer.

2 Dr Falconer's.

3 Mr Magellan's firſt eudiometer.

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* See *Air,* nº 36, 37.

* See Plate CI.

fig. 14. and 17. keeping it cloſe to its neck *n* by the notch *i*.

4 Water moſt proper for conſtructing eudiometers.

Experiments with theſe eudiometers, which are eaſily conſtructed, may be made either with water or with quickſilver; with this difference, that when the laſt is made uſe of, the eudiometers (particularly the third, repreſented fig. 8. which ſeems the fitteſt to be uſed with quickſilver) will be more convenient if made of a ſtill ſmaller ſize. Mercury, however, is a fluid that, I think, never ought to be uſed preferably to water, in the inſide of eudiometers; becauſe it ſuffers a ſenſible action from the contact with nitrous air, as yourſelf have obſerved: and this muſt have an influence on the reſult of the experiments. Water, on the contrary, ſeems leſs liable to miſtakes, although it imbibes ſome part of the nitrous air. In fact, this effect only takes place in a long time, or with much agitation: and after duly weighing the queſtion on both ſides, I ſhould think water might be generally uſed, without the fear of any ſenſible error. The weight and the dearneſs of quickſilver, are likewiſe two other conſiderations to give the preference to water in theſe experiments.

5 Method of uſing this inſtrument.

“ *The Proceſs*. In the firſt place there muſt be either a trough, as repreſented fig. 17.; or at leaſt a common tub, nearly filled up with water, unleſs the tall glaſs receiver, of which I ſhall afterwards ſpeak, be at hand. I take out the ſtopple *m* (fig. 16.) and fill the eudiometer entirely with water, keeping it in the poſition repreſented fig. 16. and 17. I then ſhut it with the ſtopple *m*, without leaving any bubble of air in the inſide; and put the lower part *c* under the ſurface of the water in the tub (fig. 17.) in an erect poſition as it is therein ſeen. I take the phial *a*, filled with water; and keeping its mouth downwards under the ſurface of the water, I fill it with that air, the ſalubrity of which I want to aſcertain (A). This is done either by putting the phial *a* on the ſhelf *n o* of the tub (fig. 17.) and throwing the air into the glaſs-funnel *t*, which is there cemented to the ſhelf; or by holding in the left hand the ſame phial *a*, together with the glaſs funnel *B* (which is repreſented fig. 18. and has no pipe at all) applied to the mouth of the phial, whilſt I pour the air with my right hand into it. But leſt the heat of my hand ſhould produce any conſiderable expanſion in this air, I generally uſe in hot weather the wooden tongs repreſented fig. 21. with two bent wires *x x*, in order to hold the glaſs funnel *z* cloſe to the mouth of the phials; unleſs they are made with a ſolid lump at their bottoms, as repreſented in the plate.—There are ſome niceties to be obſerved in order to fill up exactly any phial intended to ſerve as a meaſure of air. The eaſieſt method to ſucceed is the following: Let a glaſs funnel *t* (fig. 17.) be cemented under the hole *n* of the ſhelf *n o* in the trough. In this caſe I hold the phial *a*, filled with water, with its mouth downwards over the hole *n* of the funnel *t*: I throw the air into the funnel; and, when the phial is filled with air, I take it ſidewiſe, rubbing its mouth along the ſurface of the ſhelf, ſo that the redundant air adhering to the mouth of the phial be got off; and I put it into the mouth of the eudiometer belonging to it. But as the heat of the hand muſt expand the air contained in the phial, which of courſe will then contain leſs air than its real meaſure in the temperature of the ſurrounding water, I handle the phial with a kind of pliers or tongs of wood, repreſented fig. 21. till the neck enters into the proper place of the veſſel *c*, where I ſecure it with the other hand: and, laying aſide the wooden tongs, I make it properly tight. But if the phials have a ſolid knob at their bottoms, as repreſented in the plate, it will then be enough to handle them by it only, ſince the heat of the hand cannot be communicated in ſo ſhort a time to the air in the inſide. If I have not the convenience of a trough, prepared with a ſhelf, and its fixed funnel, as above-mentioned, an aſſiſtant holds the funnel under the water in a common tub, whilſt I fill up the phial with air: and I take care to hold the phial in ſuch a manner that the end of the funnel be out of the inſide of the phial at the laſt moment, that the air may ruſh out after it is totally filled; otherwiſe that part of the phial, occupied by the end of the funnel, will not be totally filled with the air. Even without any aſſiſtant but with a little care, a perſon may hold both the phial and the funnel in the left hand, whilſt he throws the air into it with the other; as I have myſelf frequently done in experiments of this kind: and when I make uſe of the wooden tongs, I add to it the two bent pieces of wire *x x* (fig. 21.), by means of which the funnel is kept cloſe to the mouth of the phial.

“ The phial *a* being filled with that air, the ſalubrity of which I am to examine, I put it into the mouth of the veſſel *c*, making it rather tight: which muſt be done with ſome care; for if the phials *a b* are not tight enough to the reſpective mouths of the veſſel *c*, they will ſlip out, when turned downwards, and of courſe will be broken; and, if they are too tight, the veſſel *c* will be eaſily cracked, and become unfit for uſe. The better to avoid theſe accidents, and to judge of the proper degree of tightneſs, let the necks of the phials *a b*, and of the veſſel *c*, as well as the glaſs ſtopple *m*, be always rubbed with tallow, previouſly to every experiment. When I have done with the phial *a*, I take the other phial *b*, filled with water: by the ſame method I throw into it as much *nitrous air* as to be perfectly filled up with it: and I then replace this phial *b* in the other mouth of the veſſel *c*.

“ No pains or trouble ought to be ſpared, in order to obtain, at any time, a *nitrous air* perfectly alike in its contractive power, when mixed with common air. In order to come the neareſt to this, I take a phial *D* (fig. 19.) like thoſe you have deſcribed in the ſecond volume of your work *On different Kinds of Air*: to the mouth

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(A) “ The caſe I am ſpeaking of, is when I have a bottle of air, which has been taken at any diſtant place, and ſent for trial. If a glaſs-bottle, with a ground glaſs-ſtopple, is filled with water or with mercury, and emptied in the place whoſe atmoſpherical air is intended for being examined, it will, of courſe, be filled with that air; and, being cloſely ſhut with the glaſs-ſtopple, may be carried to any diſtant place for a trial. By this means the atmoſpherical air of any part of a country may be ſent to any diſtant one, in order to aſcertain its comparative ſalubrity; and many uſeful inquiries and diſcoveries may be made hereafter on this ſubject, with great eaſe, and at very ſmall expence. But if I only want to try the air of the room, where I have the eudiometer, I then only pour out of the phial *a* the water it contains. I find that, however, after ſome trials with nitrous air, the atmoſphere about me is loaded with phlogiſtic miaſma; and for that reaſon I always empty the phial *a* out of the window of the room, in order to have nearly the ſame kind of air in all the experiments.”

mouth of which is ground air-tight the crooked tube *n z* in the ſhape of an S. I fill the half of this phial with thin braſs wire, the thickneſs of which is equal to $\frac{1}{40}$ of an Engliſh inch, nicely cut by a pin-maker to this length. I fill the three quarters of the phial with common water; and the remainder with ſtrong *nitrous acid*. I put the crooked tube *n z* to the phial: and, as ſoon as the efferveſcence cauſes the liquor to riſe to the end *z* of the tube, I paſs it under water into the mouth of the bottle *E* (fig. 20.) which is filled with water, and inverted with its mouth downwards upon the hole of the ſhelf *n o*, which appears covered with water within the trough or pan, (fig. 17.) This figure repreſents the moſt commodious ſhape a trough muſt have for any experiments on different kinds of air. It is made with ſtraight boards of elm-wood *one inch* thick. The inſide dimenſions are 25 inches long, 13¼ wide, and 11 deep, Engliſh meaſure. The two end boards, *c d* and *e f*, are fitted into a groove cut in the other three boards; this is daubed with thick white painting, as a cement, to keep well the water in: and the whole is faſtened with nails from the outſide. The ſhelf *w a n o* is eight inches wide, and two inches thick. It has three holes of three tenths of an inch diameter, with as many ſeparate cavities underneath, ſo as to ſerve as ſo many funnels. The figure, however, repreſents a glaſs funnel *t*, cemented to the middle hole *n*; which is equally convenient. This ſhelf is ſupported by four metallic hooks *V w z z*, which may be raiſed or lowered at pleaſure by the wooden wedges there repreſented. When the bottle *F* is entirely filled by the *nitrous air*, I ſhut it up with its ſtopple *x* (fig. 20.) which I paſs under the ſurface of the water, to avoid any communication with the external air: and I puſh this bottle under the ſhelf, where I let it remain for a quarter of an hour, to acquire the ſame temperature of the ſurrounding water: and the ſame I always obſerve with the bottle, containing that atmoſperical air which I deſire to try, before I put it into the phial *b*. I muſt acknowledge, however, that, notwithſtanding theſe precautions, I cannot ſay that all the reſults of my experiments, even when made upon the ſame atmoſpherical air, have as yet agreed ſo exactly as I flattered myſelf they would. Perhaps there was ſome difference in the ſtrength of the *nitrous air*, the denſity of which I thought might eaſily be brought to a ſettled ſtandard, to be determined by means of a glaſs hydrometer. Perhaps there was ſome other little variety in the circumſtances of the experiments, the influence of which I was not aware of. But let it be as it may, I very willingly leave this problem to be reſolved by abler chemiſts than I can pretend to be: and I heartily wiſh they may ſucceed better than I have done; for, without being aſſured of getting every where a certain *ſtandard nitrous air*, by which the ſame atmoſpherical air may be equally affected, we cannot draw with certainty any general deciſive concluſions from eudiometrical experiments made in diſtant times or places (b).

“ I take afterwards the eudiometer with my left hand, holding it near the lower part *d*, over the ſurface of the water in the trough, to avoid breaking any of the phials, if it chances to fall; and, with my right hand, I turn the veſſel *c* upwards, ſo that the two phials may be downwards, as repreſented fig. 14. By this operation the two kinds of air come up to *x*, from the phials *a b*; and there they mix together in the beſt poſſible manner; the particles of each having a large room to come into contact with each other; ſince the foremoſt ones do not detain thoſe which are behind, as it happens when this mixture is made in a narrow veſſel. This being done, I immediately dip the eudiometer in the water of the trough, (fig. 17.) leaving the mouth of the inſtrument above its ſurface; ſo that no more water may enter into it than what it had at firſt. I then obſerve with attention the moment when the mixture *x* (fig. 14.) of the two kinds of air comes to its greateſt diminution, after which its bulk will begin to increaſe again. In order to catch this moment with certainty, I ſlide down the braſs ring *z* of the inſtrument, as the ſurface of the water in the tube falls. This point of the greateſt diminution will be eaſily perceived, by obſerving when that inſide ſurface is ſtationary: which will happen in a few minutes, if the *nitrous air* has a proper ſtrength. The bulk of the mixed air will decreaſe to a certain degree, within a few minutes, according to the ſtrength of the *nitrous air*. Afterwards it will begin to expand again: but this it will do to a very ſhort limit, much below its former bulk. This is a phenomenon which, I think, I have obſerved the firſt on theſe experiments; having made a very great number of them with nice eudiometers, of the kind I am now deſcribing. It certainly deſerves the attention of philoſophers: and, although I have communicated it to ſome of my acquaintance, none have as yet, in my humble opinion, given a ſatisfactory ſolution of this phenomenon.

“ As ſoon as the diminution of the two kinds of air appears to be ſtationary, I fill up the whole tube of the eudiometer with water: I ſhut it up with the ſtopple *m*; and incline the top of the inſtrument forwards, till the air comes from *x* (fig. 14.) up to the top *n* of the tube. I then keep the lower part of the inſtrument dipped in the water; take off the glaſs veſſel *c* with the two phials *a b*, and raiſe or lower the tube of the eudiometer, ſo as to ſee the ſurface of the water, in the inſide, even with that in the outſide; which I mark by ſliding to it the braſs ring *z*. Otherwiſe I apply the ruler, fig. 11. (without making any uſe now of the braſs ring) to the ſide of the eudiometer, whilſt it is immerſed in the water of the trough: and there I ſee the true dimenſion of the remaining bulk of the two kinds of air, already diminiſhed. Perhaps the beſt method for this obſervation would be to allow time enough, that the mixed air may take its ſettled bulk: but this requires ſometimes 24 hours. I leave, however, the choice of theſe two methods to the obſerver, who may uſe both if he pleaſes, provided he keeps diſtinctly the reſult of each method in his account of the experiment.

(b) Two ſtriking circumſtances relating to *nitrous air* deſerve to be remarked. The firſt is the great quantity produced by the action of *nitrous acid* on metals; which may ſtill be carried to a greater extent, if helped by bringing the flame of a candle to the phial, which contains the ſolution, when it ſeems to be nearly done with emitting air. The ſecond is the antiſeptic power of *nitrous air* to preſerve animal-matters from corruption. A beef-ſtake, almoſt entirely putrid, and with an inſupportable ſtench, being put into a jar of *nitrous air*, in leſs than two days was perfectly reſtored, and very eatable when dreſſed. A pigeon was very well preſerved above ſix weeks by the ſame treatment; and, when roaſted, was found ſo good as to be eat without any diſlike. Two other pigeons were kept in it full ſix months without corruption: they were ſtill very firm and of a good colour; but the fleſh had loſt all its flavour, and was far from being eatable when dreſſed. But the *nitrous air* for theſe œconomical purpoſes, which may be of a great advantage at ſea as well as at home, muſt be made out of *nitrous acid* with iron, or other metal leſs exceptionable than braſs or copper, the effluvia of which are pernicious to animals.

“ The number marked about the middle of this ruler (fig. 11.), as for inſtance, * * =96, means that the contents of both phials *a* and *b* are equal to 96 diviſions of the ruler, when put into the tube of that eudiometer: that is to ſay, they are equal to a ſolid cylinder as thick as the inſide of the glaſs tube, and whoſe length is 96 diviſions of the ruler, which has been divided into tenths of an Engliſh inch.

“ Now if, for inſtance, this remaining bulk of mixed air correſponds to the 56th diviſion of the ruler, it ſhews that, out of 96 parts, only 40 (=96—56) have been loſt or contracted: and, in this caſe, the wholeſomeneſs of that air, which I call *A*, will be $\frac{40}{96}$. If another equal quantity of different air, which I ſhall call *B*, had alſo been tried by the ſame eudiometer, and its reſiduum was equal to 60 parts of the ſame ruler, the reſpective ſalubrity of the air *B* will then be to that of the air *A*, as 36 (=96—60) to 40.

“ But if the air *B* had been tried by another eudiometer, whoſe proportional dimenſions, marked about the middle of its ruler, were * * = 108, then the reſpective ſalubrity of theſe two kinds of air *A* and *B*, would be in the compound ratio of $\frac{36}{108}$ to $\frac{40}{96}$

$$=\frac{36\times 96 \text{ to } 40\times 108}{108\times 96}=3456 \text{ to } 4320 = 54 \text{ to } 67,5:$$

that is to ſay, the wholeſomeneſs of the air *B* would be to that of the air *A*, as 54 to 67½ (c).

“ Nearly the ſame reſults would be found, if the ruler (fig. 11.) was applied to the ſide of the eudiometer, as ſoon as the incloſed mixture of air came to its utmoſt diminution, as above-mentioned; becauſe as much water muſt fall in the tube *n d*, as correſponds to the diminution ſuffered by the two mixed airs in *x*. But there are ſome varieties, which ariſe from the different preſſure of the column of water, which preſſes more or leſs upon the air at *x* (fig. 14.) as it is longer or ſhorter: and theſe varieties ought not to be overlooked in nice experiments.

“ Whenever I have at hand a tall glaſs receiver, like that repreſented fig. 14. the whole proceſs is then more eaſily performed: for in this caſe I dip the eudiometer, inverted as it appears fig. 12. into the water contained in the veſſel *V S q l*: I then put the two kinds of air into the phials *a* and *b*, as above ſaid: I turn the inſtrument upright, as repreſented fig. 14. and finiſh the proceſs, as I have already deſcribed.

“ I muſt, however, warn the operator, that, unleſs every trial, and even almoſt every part of the proceſs, be made in the ſame temperature, or at leaſt unleſs the varieties ariſing from this cauſe be accounted for, no reliance can be had on the reſult of ſuch experiments; it being well known, that air is apt to increaſe or diminiſh very conſiderably in its bulk, by the influence of heat and cold. It is for this reaſon that I conſtantly keep a good thermometer *K*, which hangs by the wire *r*, and is immerſed in the water of the glaſs veſſel fig. 14. or in the trough fig. 17. whenever I make any of theſe experiments. For the ſame reaſon, I take care to leave the eudiometer and the veſſels of air, immerſed in water time enough, as above-mentioned, to get the ſame temperature: and I make uſe of the wooden tongs mentioned p. 2051. par. 2. whenever I handle the phials *a b* filled with air, chiefly if they have not the ſolid lump at their bottoms, as repreſented in the plate; unleſs I feel the heat of my hands to be the ſame as that of the water, in the trough, I make uſe of.

6 Second eudiometer deſcribed.

The eudiometer, repreſented fig. 15. conſiſts of a glaſs tube *t c*, two or three feet long, and of an uniform diameter: the end *c* is bent forwards; and the other end *t* is wide open, as a funnel, unleſs a ſeparate one is made uſe of: this tube is faſtened, by two loops, to the braſs ſcale *c w t V*. There is a glaſs phial *n*, the neck *V* of which is ground air-tight to the end *t* of the tube; and contains only half of the whole inſide capacity of the divided tube *c t*. It has, at the other end *c*, a large round phial *a b c*, containing three or four times the bulk of the phial *n*: its neck is alſo ground air-tight to the mouth *c* of the tube. The braſs ſcale *c w t V* is divided into 128 equal parts: this being a number that can be divided to unity in a ſubduplicate ratio without fraction, by continual biſections; on which account it is one of the numbers the late famous Mr Bird had adopted for his dividing mathematical inſtruments with the utmoſt accuracy. Theſe numbers are ſet out in the ſcale from *t* towards *c*. The contents or capacity of the tube till the number 128 is the double of the capacity of the phial *n*. Beſides this there is a tin veſſel *x s d t r o* (fig. 15.) which may ſerve as a packing-caſe for the whole inſtrument, and its neceſſary appendages; and alſo as a trough, when experiments are made, it being then filled with water. Both the glaſs tube repreſented fig. 22. and the glaſs ſtopple *m* (fig. 15.), belong to this eudiometer; and both are fitted in, air-tight, to its mouth *V*.

7 Method of uſing it.

“ Let the inſtrument be immerſed under the water *z z* of the tin veſſel fig. 15: and let the phial *n*, filled with water, be put in the inſide ſocket *e e d* of the tin veſſel. Let it be filled with *nitrous air*, as above-directed:

(c) “ It is ſuppoſed that the inſide of the tube is of an uniform diameter; but it often happens, that there are ſome varieties in different parts of its whole length. When they are not very conſiderable, we may neglect their influence in the reſult of theſe eudiometrical experiments; but, when the contrary happens, it will be very eaſy to make a proper allowance for them in the calculation. It is for this reaſon, that I have always ordered that the contents of one ſingle phial be marked alſo upon the ſcale of each eudiometer, as well as the contents of both phials; for inſtance, as in this manner:

* * = 96
* = 47

Which means, firſt, that the contents of both phials *a* and *b* are equal to a cylinder, whoſe diameter is the ſame as that of the inſide bore of the tube *n d* (fig. 16.), and whoſe height is equal to 96 equal diviſions of the ruler: ſecondly, that the contents of a ſingle phial are equal to 47 diviſions in the upper part of the ſame tube *m n d*; and, of courſe, to 49 diviſions (=96—47) of its lower part. By this difference it appears, that the tube of ſuch eudiometer is wider in the top than at the bottom, by $\frac{2}{96}$ of the whole.

rected: and let this quantity of air be thrown into the phial *a b c*, as directed above, which I fix a little tight to the mouth *c* of the eudiometer. I afterwards fill the ſame phial *n* with the air I want to try: and raiſing the end *c* of the inſtrument, I put it into its mouth *V*: when this is done, I ſet the inſtrument upright, as repreſented fig. 15. hanging it on the hook *w*; and, as ſoon as this laſt air goes up to the phial *a b c*, I take off the phial *n*, that the diminution of the two mixed airs may be ſupplied from the water in the tin veſſel; which muſt be the caſe, as the mouth *V* of the eudiometer is then under the ſurface of the water. I then put to the lower end *V* of the eudiometer, the bent tube fig. 22. to which is fitted the braſs ring *K*, and is filled with water. It is by obſerving the ſurface of the water in this ſmall tube (which then forms a true ſiphon with the tube of the inſtrument), and by means of the braſs ring *K*, that I can diſtinguiſh the ſtationary ſtate of the diminiſhing bulk of the two mixed airs, above-mentioned: which being perceived, I take off the ſmall tube *g h* from the eudiometer, and lay down, for ſome minutes, the whole inſtrument, in an horizontal poſition, under the water of the tin veſſel: I ſhut up the mouth *V* with the glaſs ſtopple *m*; and, reverſing the inſtrument, I hang it up by the end *V*, on the hook *w*. By this poſition the whole diminiſhed air of the veſſel *a b c* goes up to the top, where its real bulk is ſhewn by the number of the ſcale, facing the inſide ſurface of water. This number being deducted from 128, gives the comparative wholſomeneſs of the air already tried, without any further calculation.

"But this proceſs will be ſtill eaſier, when the laſt diminution of the two mixed kinds of air, is only required in the obſervation: becauſe no uſe will be then made of the ſiphon (fig. 22.) In ſuch a caſe, the inſtrument is left hanging on the hook *w* for 48 hours: after which it is laid down under the water of the trough (fig. 15.) in an horizontal poſition, for 8 or 12 minutes, in order to acquire the ſame temperature of the water: the mouth *V* is then ſhut up with the ſtopple *m*; the inſtrument is hung by the end *V* in a contrary poſition, and the laſt real bulk of the good mixed air will be then ſhown by the number of the braſs ſcale anſwering to the inſide ſurface of the water. This number being ſubtracted from 128, will give the comparative ſalubrity of the air employed in the trial, without any further calculation. I need not ſay that all the circumſtances already mentioned for the better obtaining exact reſults in theſe experiments, are to be carefully obſerved, when this ſecond or the third eudiometers are uſed: but chiefly that circumſtance ought never to be omitted. The thermometer is to be kept dipped in the water of the tin veſſel; and the eudiometer muſt be kept there immerſed ſome minutes, as I have ſaid juſt now, before it is raiſed for the laſt time, to read off the quantity of the total diminution of the mixed air. The ſame method muſt be applied to the third new eudiometer I am going to deſcribe; and even the firſt eudiometer, already deſcribed, may be treated in the ſame manner: for if it be laid down in an horizontal poſition under the water in the tub, before it be ſhut up with the ſtopple, there will be no variation produced by the expanſion of the air in the inſide: becauſe the proper quantity of water is then ſhut up within the glaſs veſſel *c* of the inſtrument: ſo that raiſing it up, as it is, together with the veſſel *c*, and its phials *a b* (fig. 14.) the weight of the column of water will preſs totally upon them, without expanding the incloſed air, or cauſing any variation beyond the trifling one which may proceed from the natural elaſticity of the ſides of the glaſs tube and veſſels.

"I muſt, however, acknowledge, that the long way through which the air paſſes, in going at firſt to the large phial *a b c*, in this ſecond eudiometer, muſt leave ſome doubt whether it has not then ſuffered ſome ſenſible change in its quality before it is mixed with the *nitrous air*; ſince, as you have obſerved, the air that has been long agitated in water, changes for the better from its bad qualities: and this objection muſt be ſtill greater in the uſe of the third eudiometer. It is on this account that I have mentioned the firſt eudiometer, as the leaſt exceptionable of all that we know till the preſent; and perhaps the nature of the thing is not capable of a further perfection. Indeed that inſtrument, I mean my firſt eudiometer, has not only the advantage of offering a very ſmall way through the water to the two kinds of air, on their going to mix at *x* in the veſſel *c* (fig. 14.), but they are kept ſeparate till that moment, in the two reſpective phials *a* and *b*, without any other contact with the water, but only in the narrow diameter of the necks of theſe phials.

8
Third eudiometer deſcribed.

"The third eudiometer conſiſts of a ſtrait glaſs-tube *e n* (fig. 8.) of an uniform diameter, about one or two feet long, with a large ball *s*, and a glaſs ſtopple *m*, fitted air-tight to the mouth *n*, which ought to be wide open, as a funnel, unleſs a ſeparate one is made uſe of. There is alſo a ſmall ſiphon (fig. 23.) with a braſs ring *x*: a ſmall phial *z* (fig. 9.) the contents of which may be received in the third part of the ball *s*; and, when put into the glaſs tube *n s*, muſt take there no more than the half of its length. Laſtly, this inſtrument has a ruler (fig. 13.) which is divided and ſtamped like that other already deſcribed above; and a glaſs funnel, which is ground to the mouth *n* of the inſtrument, when this is not wide open, as already ſaid.

9
Method of uſing it.

"The uſe of this inſtrument is eaſily underſtood by what I have already ſaid of the two preceding ones. Firſt, it is filled with water, and ſet in a vertical poſition, with the mouth *n* under the ſurface of the water in a tub, or in a trough, (fig. 17.) Secondly, the phial *z* (fig. 9.) is filled, as above, with *nitrous air*; and thrown into the tube by means of the glaſs funnel *y* (fig. 10.) which is ground to the mouth *n* of the eudiometer; unleſs it be wide enough not to be in need of any funnel. Thirdly, the ſame phial *z* is again filled with the air to be tried; and thrown into the ſame. Fourthly, the ſiphon (fig. 23.) is added immediately to the mouth *n* of the eudiometer, under the ſurface of the water; ſome of which is to be poured into it. Fifthly, the ſtationary moment of the greateſt diminution of the mixed air at *s*, is watched by means of the ring *x*, as above-mentioned. Sixthly, when that moment arrives, the ſiphon *K l* (fig. 23.) is taken off; the eudiometer is laid for ſome minutes under the water, in an horizontal poſition, or nearly ſo, but in ſuch a manner that no part of the incloſed air may get out; the mouth *n* is ſhut up with the glaſs ſtopple *m*, and the inſtrument is inverted with the mouth *n* upwards. Laſtly, the ſpace occupied by the reſiduum of the diminiſhed air, is meaſured by applying to its ſide the divided ruler or ſcale (fig. 13.) and the reſult is eſtimated after the manner already explained.

“ When I want only to know the laſt diminution of the mixed air, the proceſs then becomes eaſier, as no uſe is made of the ſiphon (fig. 23.) The method of conducting the proceſs in ſuch a caſe being reſpectively the ſame as that already deſcribed, it is unneceſſary to deſcribe it here again. The ſame precautions I have ſpoken off, muſt be obſerved when this eudiometer is made uſe of, in order to form a true judgment concerning thoſe places, where people will be able to live without danger of hurting their conſtitutions by breathing and being continually ſurrounded by noxious air; which they have not yet been able to diſtinguiſh from the moſt wholeſome, except by a long and too late experience.

“ The eudiometers already deſcribed are the fitteſt inſtruments for philoſophical experiments on the bulk of air and other fluids, when mixed together; and even when mixed with ſome ſolid ſubſtances, which can be introduced into the lower veſſel *c* of the firſt of the three eudiometers. It will be better, however, to have them made purpoſely for ſuch objects, with a tube two or three times longer than I have indicated above.

10 How to mark the preciſe point of ſaturation.

Whenever dephlogiſticated air is to be tried by theſe inſtruments, proper care is to be taken to obſerve the preciſe point of its full ſaturation, which is that of its greateſt diminution by the addition of *nitrous air*. In order to make this experiment with great accuracy, let a narrow glaſs tube of an uniform diameter (fig. 24.) be provided: let one of the two phials *a* or *b* (fig. 16.) filled with quickſilver, be thrown into it, and the tube cut exactly to that ſize, ſo as to contain neither more nor leſs. Let its whole length be divided into ſome number of equal parts, by which number the value marked on the ruler (fig. 11.) of this eudiometer, can be divided without any fraction: for inſtance, the number ∗ ∗ = 108, marked in the ruler, means, that the contents of the two phials *a* and *b*, are equal to a cylinder of 108 diviſions long, as thoſe of the ruler: and, of courſe, it ſhews that a ſingle phial *a* or *b* contains but 54 of theſe parts. In this caſe this tube (fig. 24.) may be divided either into 27 parts, each containing two of the ruler; or into 54, into 108, &c.

N. B. If the top of the tube is not very flat in the inſide, it will be more exact, to divide the weight of the quickſilver in two parts; to put one of them into the tube; to mark the ſpace occupied by it; to divide the part of it which was empty, into half the number intended for this tube; and afterwards to divide the other half into ſimilar equal parts, as the firſt half, carrying them towards the cloſed end.

If the deplogiſticated air is very pure, it will require almoſt double the quantity of nitrous air to be completely ſaturated. In order to do this without exceeding the neceſſary quantity, I throw into the tube *n d* (fig. 17.) a ſecond meaſure *b* or *a* of nitrous air, after I have brought the proceſs to the moment abovementioned; in this caſe the whole volume or bulk of the dephlogiſticated and nitrous air will be 162 [=108 ×54:] I obſerve where the ſurface of the inſide water in the tube ſtops, and I mark it by the ſliding braſs ring *z*. I then fill up the divided tube (fig. 24.) with nitrous air: I throw a ſmall quantity into the eudiometer tube *n d;* and, if it becomes of a reddiſh colour, the incloſed air will diminiſh: I then puſh up the ring *z*; and by this means, I go on throwing in the nitrous air, by little and little, till I ſee that the whole diminiſhes no more; which ſhews me that it is fully ſaturated. Let us ſuppoſe, for example, that the tube (fig. 24.) was divided only into 27 equal parts; and that the ſaturation of the dephlogiſticated air was completed at the eighth diviſion of it: this ſhews that 19 parts [27—8=19], equal to 38 of thoſe marked in the ruler, have been thrown into the eudiometer; that is to ſay, that the whole bulk of both kinds of air is equal to 200 [=162+38] ſuch meaſures as thoſe marked by the diviſions of the ruler (fig. 11.) Now if the remaining quantity of air within the eudiometrical tube is only equal to two meaſures or numbers of the ruler, it is clear that ſuch dephlogiſticated air is 99 times of 100 $\left[\frac{200-2}{200}=\frac{198}{200}=\frac{99}{100}\right]$ pure air; ſince its bulk is reduced, by the combination of nitrous air, to the $\frac{1}{100}$ of the whole.

EUDOSIA, (ATHENIA, before her converſion to Chriſtianity), a celebrated lady, the daughter of Leontius, philoſopher of Athens; who gave her ſuch a learned education, that at his death, he left her only a ſmall legacy, ſaying ſhe was capable to make her own fortune: but pleading at Athens without ſucceſs againſt her two brothers, for a ſhare in her father's eſtate, ſhe carried her cauſe perſonally by appeal to Conſtantinople; recommended herſelf to Pulcheria, the ſiſter of the emperor Theodoſius the younger; embraced Chriſtianity; was baptized by the name of *Eudoſia*, and ſoon after married to the emperor. Their union laſted a conſiderable time: but a difference at laſt taking place, on account of the emperor's jealouſy excited by Chryſapius the eunuch, ſhe retired to Jeruſalem, where ſhe ſpent many years in building and adorning churches, and in relieving the poor. Dupin ſays, that ſhe did not return thence till after the emperor's death: but Cave tells us that ſhe was reconciled to him, returned to Conſtantinople, and continued with him till his death; after which ſhe went again to Paleſtine, where ſhe ſpent the remainder of her life in pious works. She died in the year 460, according to Dupin; or 459, according to Cave: the latter obſerves, that on her death-bed ſhe took a ſolemn oath, by which ſhe declared herſelf entirely free from any ſtains of unchaſtity. She was the author of a paraphraſe on the eight firſt books of the Old Teſtament, in heroic verſe; and of a great number of poems, which are loſt.

EVE, the mother of all mankind; who being deluded by the ſerpent, occaſioned the fall, and all its diſmal conſequences. See ADAM.

EVELYN (John), a moſt learned and ingenious writer and natural philoſopher, was born at Wotton in Surry, the ſeat of his father, in 1620. After making the tour of Europe, he returned to England about the year 1651, and lived very retired at his rural retreat, Say's Court, near Deptford in Kent; where his diſguſt at the violence and confuſion of the times, operated ſo far upon his ſtudious diſpoſition, that he actually propoſed to Mr Boyle, the eſtabliſhing a kind of college for perſons of the ſame turn of mind, where they might aſſociate together without care or interruption. It was owing to Mr Evelyn's gratitude to the place of his education, that Oxford became poſſeſſed of the famous Arundelian Marbles; which he perſuaded the Lord Henry Howard to beſtow on that univerſity. He was very aſſiduous in tranſmitting to the royal ſociety whatever fell within the compaſs of his inquiries; and uſed humbly to ſtyle himſelf "a pioneer in the ſervice." When the number of books he publiſhed is conſidered, the many he left behind him unfiniſhed and unpubliſhed, and the variety of ſubjects on which he employed his time, his induſtry and application are aſtoniſhing. "His life, (ſays the honourable Mr Walpole), was a courſe of inquiry, ſtudy, curioſity, inſtruction, and benevolence. The works of the Creator, and the mimic labours of the creature, were all objects of his purſuit. He unfolded the perfections of the one, and aſſiſted the imperfections of the other. He adored from examination; was a courtier that flattered only by informing his prince, and by pointing out what was worthy for him to countenance; and was really the neighbour of the Goſpel, for there was no man that might not have been the better for him. He was one of the firſt promoters of the royal ſociety, a patron of the ingenious and indigent, and peculiarly ſerviceable to the lettered world; for beſides his writings and diſcoveries, he obtained the Arundelian marbles for the univerſity of Oxford, and the Arundelian library for the royal ſociety: nor is it the leaſt part of his praiſe, that he who propoſed to Mr Boyle the erection of a philoſophic college for retired and ſpeculative perſons, had the honeſty to write in defence of active life againſt Sir George Mackenzie's Eſſay on Solitude. He knew that retirement in his own hands was induſtry and benefit to mankind; but in thoſe of others, lazineſs and inutility." There are five ſmall prints of this gentleman's journey from Rome to Naples, drawn and etched by him; and among his publiſhed works are, 1. A Character of England; 2. The State of France; 3. An Eſſay on the firſt book of Lucretius *de Rerum Natura*; 4. The French gardener; 5. A Panegyric on king Charles the Second's coronation; 6. *Fumifugum*, or the inconveniences of the air and ſmoke of London diſſipated; 7. The hiſtory and art of engraving on copper; 8. A parallel between the ancient architecture and the modern; 9. Sylva, or a diſcourſe of foreſt-trees; and ſeveral others. This amiable gentleman died, full of age and honour, in 1706.—His ſon John Evelyn, born in 1654, diſtinguiſhed himſelf by his elegant tranſlations and poems: He was one of the commiſſioners of the revenue in Ireland; but died early in life, in 1698.

EUGENE (Francis), prince of Savoy, deſcended from Carignan, one of the three branches of the houſe of Savoy, and ſon of Eugene Maurice, general of the Swiſs and Griſons, governor of Champagne, and earl of Soiſſons, was born in 1663. Lewis XIV. to whom he became afterwards ſo formidable an enemy, thought him ſo unpromiſing a youth, that he refuſed him preferment both in the church and the ſtate, thinking him too much addicted to pleaſure to be uſeful in either. Prince Eugene, in diſguſt, quitted France; and, retiring to Vienna, devoted himſelf to the imperial ſervice. The war between the emperor and the Turks afforded the firſt opportunity of exerting his military talents; and every campaign proved a new ſtep in his advancement to the higheſt offices in the army. He gave the Turks a memorable defeat at Zenta; commanded the German forces in Italy, where he foiled marſhal Villeroy in every engagement, and at length took him priſoner. Our limits do not allow a detail of his campaigns; but prince Engene diſtinguiſhed himſelf greatly, when the emperor and queen Anne united againſt the exorbitant power of Lewis XIV. He died at Vienna in the year 1736; and was as remarkable for his modeſty and liberality, as for his abilities in the field and the cabinet.

EVERGREEN, in gardening, a ſpecies of perennials, which continue their verdure, leaves, &c. all the year: ſuch are hollies, phillyrea's, lauruſtinus's, bays, pines, firs, cedars of Lebanon, &c.

EVES-DROPPERS. See EAVES-*Droppers*.

EVERLASTING PEA, a genus of plants, otherwiſe called *lathyrus*. See LATHYRUS.

EVESHAM, a borough-town of Worceſterſhire, ſeated on a gentle aſcent from the river Avon, over which there is a bridge of ſeven arches. W. Lon. 2. 0. N. Lat. 52. 10.

EUGENIA, the YAMBOO, or *Silver-tree*; a genus of the monogynia order, belonging to the icoſandria claſs of plants. There are two ſpecies, both natives of the hot parts of Aſia. They riſe from 20 to 30 feet high; and bear plumb-ſhaped fruit, incloſing one nut. They are too tender to live in this country, unleſs they are conſtantly kept in a ſtove.

EVICTION, in law, ſignifies a recovery of lands, or tenements, by law.

EVIDENCE, that perception of truth which ariſes either from the teſtimony of the ſenſes, or from an induction of reaſon.

EVIDENCE, in law, ſignifies ſome *proof*, by teſtimony of men upon oath, or by writings or records. It is called *evidence*, becauſe thereby the point in iſſue in a cauſe to be tried, is to be made *evident* to the jury; for "probationes debent eſſe evidentes et perſpicuæ." The ſyſtem of evidence, as now eſtabliſhed in our courts of common law, is very full, comprehenſive, and refined; far different from, and ſuperior to, any thing known in the middle ages;—as far ſuperior in that as in all other improvements and refinements in ſcience, arts, and manners. Vid. *Blackſt. Comment.* iii. 367,—375. iv. 350,—360.

The nature of evidence during the ages of ignorance was extremely imperfect, and the people were incapable of making any rational improvement. Thus it was the imperfection of human reaſon that cauſed the invention and introduction of the ORDEAL, as an appeal to the Supreme Being. As men are unable to comprehend the manner in which the Deity carries on the government of the univerſe, by equal, fixed, and general laws, they are apt to imagine, that, in every caſe which their paſſions or intereſt render important in their own eyes, the Supreme Ruler of all ought viſibly to diſplay his power in vindicating innocence and puniſhing vice. See *Robertſon's Charles V.* vol. i. p. 48, &c.

EVIL, in philoſophy, &c. is either moral or natural. Moral evil is the diſagreemeent between the actions of a moral agent, and the rule of thoſe actions whatever it is *.—Natural evil, is whatever deſtroys or any way diſtrubs the perfection of natural beings: ſuch as blind-

* See *Mor* *Philoſophy*.

blindneſs, diſeaſes, death, &c. See theſe articles.

King's Evil, in medicine, the ſame with the Scrophula.

EULOGY, in church-hiſtory, a name by which the Greeks call the *panis benedictus*, or bread over which a bleſſing is pronounced, and which is diſtributed to thoſe who are unqualified to communicate.

EUMENES, the moſt worthy of Alexander's ſucceſſors and generals; was baſely delivered up by his own troops to his rival Antigonus, and by him put to death, 315 B. C.

Eumenes II. king of Pergamus, a valiant general, patron of learning, and founder of the famous library at Pergamos, on the model of that at Alexandria. He died 159 B. C. after a reign of 39 years.

EUMENIDES, in antiquity, the ſame with the Furies.

EUNAPIUS, a native of Sardis in Lydia, a celebrated ſophiſt, phyſician, and hiſtorian, who flouriſhed in the 4th century, under the emperors Valentinian, Valens, and Gratian. He wrote "The lives of the Philoſophers and Sophiſts," in which he frequently ſhews himſelf a bitter enemy to the Chriſtians: alſo a hiſtory of the Ceſars, which he deduced from the reign of Claudius, where Herodian left off, down to that of Arcadius and Honorius. The hiſtory is loſt; but we have the ſubſtance of it in Zoſimus, who is ſuppoſed to have done little more than copy it.

EUNOMIANS, in church-hiſtory, Chriſtian heretics in the 4th century. They were a branch of Arians, and took their name from Eunomius biſhop of Cyzicus; whoſe confeſſion of faith here follows, extracted from Cave's *Hiſtoria Literaria*, vol. i. p. 223. "There is one God uncreate and without beginning; who has nothing exiſting before him, for nothing can exiſt before what is incarnate; nor with him, for what is uncreate muſt be one; nor in him, for God is a ſimple and uncompounded being. This one ſimple and eternal being is God, the creator and ordainer of all things: firſt indeed and principally of his only begotten Son; and then, through him, of all other things. For God begot, created, and made, the Son, only by his direct operation and power, before all things, and every other creature; not producing, however, any being like himſelf, or imparting any of his own proper ſubſtance to the Son: for God is immortal, uniform, indiviſible; and therefore cannot communicate any part of his own proper ſubſtance to another. He alone is unbegotten; and it is impoſſible that any other being ſhould be formed of an unbegotten ſubſtance. He did not uſe his own ſubſtance in begetting the Son, but his will only: nor did he beget him in the likeneſs of his ſubſtance, but according to his own good pleaſure. He then created the Holy Spirit, the firſt and greateſt of all ſpirits, by his own power indeed and operation mediately, yet by the immediate power and operation of the Son. After the Holy Spirit he created all other things in heaven and in earth, viſible and inviſible, corporeal and incorporeal, mediately by himſelf, by the power and operation of the Son, &c.

EUNOMIUS, a famous hereſiarch of the 4th century, the diſciple of Elius, but abundantly more ſubtil than his maſter, as well as more bold in propagating the opinions of his ſect, who after him are called Eunomians. He was ordained biſhop of Cyzicus; but gave ſo much diſturbance by the intemperance of his zeal, that he was depoſed more than once: and, tired at length with being toſſed about, he petitioned to retreat to the place of his birth, Dacora in Cappadocia; where he died very old about the year 394, after experiencing a variety of ſufferings. The greateſt part of his works are loſt. There is, however, beſides two or three ſmall pieces, a confeſſion of his faith remaining, which Cave inſerted in his *Hiſtoria Literaria*, from a manſcript in archbiſhop Tenniſon's library. See the preceding article.

EUNUCH, a caſtrated perſon. See the article Castration.—The word is formed from ευνην εχει, q. d. *lecti curam habet*, "*guardian* or *keeper* of the bed."

In Britain, France, &c. eunuchs are never made but upon occaſion of ſome diſeaſe, which renders ſuch an operation neceſſary: but in Italy, they make great numbers of children, from one to three years of age, eunuchs, every year, to ſupply the operas and theatres of all Europe with ſingers; though it is not one in three, that, after having loſt his virility, has a good voice for a recompenſe. In the eaſtern parts of the world, they make eunuchs in order to be guards or attendants on their women. The ſeraglio of the eaſtern emperors are chiefly ſerved and guarded by eunuchs; and yet, from good authority, we learn, that the rich eunuchs in Perſia and other countries keep ſeraglios for their own uſe. Thoſe who, out of an imprudent zeal to guard themſelves from ſenſual pleaſures, made themſelves eunuchs, were, by the council of Nice, condemned and excluded from holy orders. There are ſeveral ſevere prohibitions in Germany againſt the making of eunuchs; and in France an eunuch muſt not marry, not even with the conſent of the woman.

Eunuchs, in church-hiſtory, a ſect of heretics, in the third century, who were mad enough to caſtrate, not only thoſe of their own perſuaſion, but even all others they could lay hold of. They took their riſe from the example of Origen, who, miſunderſtanding the following words of our Saviour, "and eunuchs who made themſelves eunuchs for the kingdom of heaven," caſtrated himſelf.

EVOCATI, among the Romans, ſoldiers who having ſerved their time in the army, went afterwards volunteers at the requeſt of ſome favourite general.

EVOCATION (*Evocatio*,) among the Romans, a religious ceremony always obſerved by them at the undertaking a ſiege, wherein they ſolemnly called upon the gods and goddeſſes of the place to forſake it and come over to them. Without the performance of this ceremony, they either thought that the place could not be taken, or that it would be a ſacrilege to take the gods priſoners. They always took it for granted that their prayer was heard, and that the gods had deſerted the place and come over to them, provided they were able to make themſelves maſters of it.

EVOLUTION, in algebra. See Algebra, n° 9.

Evolution, in the art of war, the motion made by a body of troops, when they are obliged to change their form and diſpoſition, in order to preſerve a poſt, or occupy another, to attack an enemy with more advantage, or to be in a condition of defending themſelves the better.

It conſiſts in doublings, counter-marches, convertion, ſions, &c. A battalion doubles the ranks, when attacked in front or rear, to prevent its being flanked or ſurrounded; for then a battalion fights with a larger front. The files are doubled, either to accommodate themſelves to the neceſſity of a narrow ground, or to reſiſt an enemy that attacks them in flank. But if the ground will allow it, converſion is much preferable; becauſe, after converſion, the battalion is in its firſt form, and oppoſes the file-leaders, which are generally the beſt men, to the enemy; and likewiſe, becauſe doubling the files in a new or not well-diſciplined regiment, they may happen to fall into diſorder. See DOUBLING.

EUONYMUS, the SPINDLE-TREE; a genus of the monogynia order, belonging to the pentandria claſs of plants. There are two ſpecies. 1. The europæus, hath an upright woody ſtem 10 or 15 feet high, garniſhed with oblong oppoſite leaves: from the ſides of the branches proceed ſmall bunches of greeniſh quadrifid flowers, ſucceeded by pentagonous capſules, diſcloſing their ſeeds in a beautiful manner in autumn. 2. The americanus, or evergreen ſpindle-tree, hath a ſhrubby ſtem, dividing into many oppoſite branches, riſing ſix or eight feet high, garniſhed with ſpearſhaped evergreen leaves growing oppoſite, and from the ſides and ends of the branches. The flowers are quinquefid and whitiſh, and come out in ſmall bunches, ſucceeded by roundiſh, rough, and protuberant capſules, which rarely perfect their ſeeds in this country. Both theſe ſpecies are hardy, and will ſucceed in any ſoil or ſituation.—The berries of the firſt ſort vomit and purge very violently, and are fatal to ſheep. If powdered and ſprinkled upon hair, they deſtroy lice. If the wood is cut when the plant is in bloſſom, it is tough and not eaſily broken; and in that ſtate it is uſed by watchmakers for cleaning watches, and for making ſkewers and tooth-pickers. Cows, goats, and ſheep, eat this plant; horſes refuſe it.

EUPATORIUM, HEMP-AGRIMONY; a genus of the polygamia æqualis order, belonging to the syngeneſia claſs of plants. There are 13 ſpecies, many of them herbaceous flowery perennials, producing annual ſtalks, from two to three or five feet high, terminated by cluſters of compound flowers of a red, purple, or white colour. They are eaſily propagated by ſeeds, or parting the roots in autumn or ſpring. One ſpecies, viz. the cannabinum, or water hemp-agrimony, is a native of Britain. It grows by the banks of rivers and brooks, and has pale-red bloſſoms. The whole plant hath a very bitter taſte. A decoction of the roots operates as a violent emetic and cathartic; and is ſometimes taken by the lower claſs of people, to cure the jaundice, dropſy, &c. Dr Boerhaave uſed an infuſion of this plant to foment ulcers and putrid ſores. Tournefort informs us, that the Turks cure the ſcurvy with it. An ounce of the juice or a dram of the extract is a doſe.

EUPHYMISM. See ORATORY, n° 56.

EUPHORBIA, SPURGE; a genus of the trigynia order, belonging to the dodecandria claſs of plants. There are 62 ſpecies, ſix of which are natives of Great Britain. They are moſtly ſhrubby and herbaceous ſucculents, frequently armed with thorns, having ſtalks from 10 or 12 inches to as many feet in height, with quadripetalous flowers of a whitiſh or yellow colour. They are eaſily propagated by cuttings; but the foreign kinds muſt be always kept in pots in a ſtove. If kept dry, they may be preſerved for ſeveral months out of the ground, and then planted; when they will as readily take root as though they had been freſh. The juice of all the ſpecies is ſo acrid, that it corrodes and ulcerates the body wherever it is applied; ſo that phyſicians have ſeldom ventured to preſcribe it internally. Warts, or corns, anointed with the juice, preſently diſappear. A drop of it put into the hollow of an aching tooth, gives relief, like other corroſives, by deſtroying the nerve. Some people rub it behind the ears, that it may bliſter. One of the foreign ſpecies, named *eſula*, is ſuch a violent corroſive, that, if applied to any part of the body, it produces a violent inflammation, which is ſoon ſucceeded by a ſwelling that degenerates into a gangrene, and proves mortal. IPECACUANHA is the root of another ſpecies. A third hath obtained the name of *ſterculia*, or dirt-wood, from its ſmell, which is ſaid exactly to reſemble human excrements.

EUPHORBIUM, in the materia medica; a gum reſin, brought us always in looſe, ſmooth, and gloſſy gold-coloured drops or granules. It is the produce of the euphorbium antiquorum verum, which grows to 10 or 12 feet high. Its principal uſe is externally in ſinapiſms, and plaſters applied to the feet, which are intended to ſtimulate, but not abſolutely to raiſe bliſters: for it is obſerved by Aviſenna, that, when taken internally in large doſes, it has been found to exulcerate the inteſtines, and bring on death itſelf after the moſt terrible ſymptoms.

EUPHORION *of* CHALCIS, a poet and hiſtorian, born in the 126th Olympiad. Suetonius ſays that Tiberius compoſed verſes in imitation of Euphorion, Rianius, and Parthenius; with whom he was charmed to ſuch a degree, that he ordered their writings and their pictures to be kept in all the public libraries, among the ancient and celebrated authors.

EUPHRASIA, EYE-BRIGHT; a genus of the angioſpermia order, belonging to the didynamia claſs of plants. There are ſeven ſpecies; two of which, viz. the officinalis and odontites, are natives of Britain. The firſt of theſe, which hath blue flowers, is a weak aſtringent, and was formerly much celebrated in diſorders of the eyes; but the preſent practice hath not only diſregarded its internal, but alſo its external uſe. This plant will not grow but when ſurrounded by others taller than itſelf. Cows, horſes, goats, and ſheep, eat it; ſwine refuſe it.

EUPHRATES, a river univerſally allowed to take its riſe in Armenia Major; but in what particular ſpot, or in what direction it afterwards ſhapes its courſe, there is the greateſt diſagreement. Strabo ſays, that the Euphrates riſes in mount Abus, which he joins with, or accounts a part of, mount Taurus; that its beginning is on the north ſide of mount Taurus; and that running, firſt weſtward, through Armenia, then ſtriking off to the ſouth, it forces its way through that mountain: and thus it riſes in the ſouth of Armenia, mount Taurus being the boundary on that ſide; and runs through its ſouth part, quite to Cappadocia, conterminal with Armenia Minor; or quite to this laſt, or to its ſouth limit; to reach which, it muſt bend its weſt courſe a little north; becauſe the Taurus, from which it roſe, lies lower, or more to the ſouth, and almoſt parallel with Melitene: and that then it turns to the ſouth, in order to break through the Taurus, and eſcape to Syria, and then take a new bend to Babylonia. To this account of Strabo, Pliny runs quite counter; adducing eye-witneſſes, who carry the Euphrates from north to ſouth in a right line, till it meets mount Taurus; placing the ſprings together with mount Abus, or Aba, which inclines to the weſt, to the north of Taurus, all counter to Strabo. Ptolemy ſtrikes a middle courſe between both, placing the ſprings to the eaſt, as Strabo does; whence, he ſays, it runs in a long courſe weſtward, before it bends ſouth; and that it riſes not from mount Taurus, but far to the north of it; and he makes it run ſtraight weſt from its riſe, then turn ſouth ſpontaneouſly, without any interpoſing obſtacle, in a manner quite different from Strabo, Mela, and others, who make the Taurus the cauſe of this turn. No wonder then that the ſprings of the Nile are unknown, if a river almoſt at the door is ſo little underſtood. The Euphrates naturally divides into two channels, one through Babylon, and the other through Seleucia, beſides the ſeveral artificial cuts made between it and the Tigris about Babylon: and theſe cuts or trenches are what the Pſalmiſt calls the rivers of Babylon, on the willows of which the captives hung their harps. It is probable, that the Euphrates naturally poured into the ſea at one particular mouth, before theſe cuts were made. A thing appearing ſo evident to the ancients, that Pliny has ſet down the diſtance between the mouths of the Euphrates and the Tigris: and he ſays, ſome made it 25, and others 7, miles; but that the Euphrates being for a long time back intercepted in its courſe by cuts, made for watering the fields, only the branch called the *Paſitigris* fell into the ſea, the reſt of it into the Tigris, and both together into the Perſian Gulf. Overflowing the country through which it runs, at ſtated times of the year, like the Nile, it renders it fertile.

EUPOLIS, an Athenian comic poet, flouriſhed about the 85th Olympiad. He took the freedom of the ancient comedy in laſhing the vices of the people. He loſt his life in a ſea-fight between the Athenians and Lacedemonians; and his fate was ſo much lamented, that, after his death, it was enacted, that no poet ſhould ſerve in the wars. Some ſay Alcibiades put him to death for his ſatirical freedom.

EVREMOND (Charles de St Denis), born at St Denis le Guaſt in Lower Normandy in 1613, was deſigned for the gown, and entered on the ſtudy of the law; but he ſoon quitted that, and was made an enſign before he was 16. A military life did not hinder him from cultivating polite literature; and he ſignalized himſelf by his politeneſs and wit as much as by his bravery. The king made him a mareſchal de camp, and gave him a penſion of 3000 livres per annum. He ſerved under the duke of Candale in the war of Guienne; and in Flanders, till the ſuſpenſion of arms was agreed on between France and Spain: he afterwards accompanied cardinal Mazarine when he went to conclude the peace with Don Lewis de Haro, the king of Spain's firſt miniſter. He wrote, as he had promiſed, a long letter to the marquis de Crequi, of this negociation; in which he ſhewed, that the cardinal had ſacrificed the honour of France to his own private intereſt, and rallied him in a very ſatirical manner. This letter falling into the hands of the cardinal's creatures ſome time after his death, was repreſented as a ſtate-crime, and he was obliged to fly to Holland. He had too many friends in England, (whither he had taken a tour the year before, with the count de Soiſſons, ſent to compliment Charles II. upon his reſtoration) to make any long ſtay in Holland; and therefore paſſed over into England, where he was received with great reſpect, and admitted into intimate friendſhip with ſeveral perſons of diſtinction. The king gave him a penſion of 300l. a-year. He had a great deſire to return to his native country; and, after the peace of Nimeguen, wrote a letter in verſe to the king of France to aſk leave, but in vain. Upon the death of king Charles, he loſt his penſion. He did not rely much on king James, though that prince had ſhewn himſelf extremely kind to him. The revolution was advantageous him. King William, who had known him in Holland, gave him ſubſtantial marks of his favour. He died of a ſtranguary in 1703, aged 90; and was interred in Weſtminſter-abbey, where a monument is erected to his memory. His behaviour was engaging, his humour cheerful, and he had a ſtrong diſpoſition to ſatire: he profeſſed the Romiſh religion, in which he was born; but at the bottom was certainly a freethinker. He always ſpoke of his diſgrace with the reſolution of a gentleman; and whatever ſtrong deſire he had to return to his country, he never ſolicited the favour with meanneſs: therefore, when this leave was ſignified to him unexpectedly in the decline of his life, he replied, that the infirmities of age did not permit him to leave a country where he lived agreeably. There have been many editions of his works: but the beſt is that of Amſterſtam in 1726, in 5 vols 12mo, to which is prefixed his life by Doctor Des Maizeaux; who has alſo given an accurate Engliſh tranſlation of them in 3 vols 8vo.

EURIPIDES, one of the Greek poets who excelled in tragedy, was born about 486 B. C. in the iſle of Salamis, whither his father and mother had retired a little before Xerxes entered Attica. He learnt rhetoric under Prodicus, morality under Socrates, and natural philoſophy under Anaxagoras; but at 18 years of age abandoned philoſophy, in order to apply himſelf to dramatic poetry. He uſed to ſhut himſelf up in a cave to compoſe his tragedies, which were extremely applauded by the Greeks. The Athenian army, commanded by Nicias, being defeated in Sicily, the ſoldiers purchaſed their lives and liberties by reciting the verſes of Euripides; ſuch eſteem and veneration had the Sicilians for the pieces wrote by this excellent poet. Socrates, the wiſeſt of the philoſophers, ſet ſuch a value upon them, that they were the only tragedies he went to ſee acted; and yet his performances ſeldom gained the prize. Euripides frequently interſperſes through them moral ſentences, and ſevere reflections on the fair-ſex; whence he was called the *Woman-hater*. He was, nevertheleſs, married: but the ſcandalous lives of his two wives drew upon him the raillery of Ariſtophanes, and other comic poets; which occaſioned his retiring to the court of Archelaus, king of Macedon, where he was well received. That prince was fond of learned men, and drew them to him by his liberality. If we may believe Solinus, he made Euripides his miniſter of ſtate, and gave him other extraordinary proofs of his eſteem. He had, however, paſſed but a few years there, when an unhappy accident put an end to his life. He was walking in a wood, and, according to his uſual manner, in deep meditation; when, unfortunately happening upon Archelaus's hounds, he was by them torn in pieces. It is not certain whether his death happened by chance, or through envy of ſome of the great courtiers. However, Archelaus buried him with great magnificence; and the Athenians were ſo much afflicted at his death, that the whole city went into mourning. Of 92 tragedies which he compoſed, only 19 are remaining: the moſt valuable editions of which are thoſe of Aldus, in 1503, 8vo; of Plantin, in 1570, ſexeſimo; of Commelin, in 1597, 8vo; of Paul Stevens, in 1604, 4to; and of Joſhua Barnes, in 1694, folio.

EURIPUS, now the NEGROPONT, a canal or ſtrait which divides the iſland of Eubœa from the continent of Greece. In one place it is ſo narrow, that a galley can ſcarce paſs through it. The agitations of the Euripus were much ſpoken of by the ancients. Some ſay that the canal has a flux and reflux ſix times in 24 hours; others, that it ebbs and flows ſeven times a day; but Livy does not allow this flux and reflux to be ſo regular. Father Babin, a Jeſuit of great learning, who made many obſervations on the ſpot during his long abode in the iſland of Negropont, tells us, that the Euripus is regular in its ebbing and flowing the firſt eight days of the moon: the ſame regularity he obſerved from the 14th to the 20th day incluſive, and in the three laſt days: but in the other days of the lunar month, it is not ſo regular; for it ſometimes ebbs and flows 11, 12, 13, and 14 times in the ſpace of a natural day.

EUROPA, in fabulous hiſtory, daughter of Agenor, king of Phœnicia; with whom Jupiter being in love, transformed himſelf into a bull, and ran away with her into this part of the world, which from her is called *Europe*.

EUROPE, one of the quarters of the world, bounded on the north by the Frozen Ocean, on the weſt by the Weſtern Ocean, on the ſouth by the Mediterranean, which ſeparates it from Africa, and by the Archipelago, which divides it in part from Aſia, as alſo by the Black Sea, then by the river Don, till it comes near the river Volga or Wolga, and then it is parted from Aſia by this laſt, and afterwards by the river Oby. Europe is ſituated between Long. 9. 35. W. and 72. 25. E. and Lat. 35° and 72° N. It is about 3300 miles in length, from Cape St Vincent in Portugal, to the river Oby in Ruſſia; and 2200 miles in breadth, from Cape Matapan, in the Morea, to the North Cape of Norway. We may judge by this, that it is much leſs than Aſia and Africa: but it is in many things more conſiderable than both.

Europe, excepting a ſmall part of Lapland and Muſcovy, is ſituated in the temperate zone; inſomuch, that we neither feel the extremities of heat nor cold. We cannot boaſt of rich mines of gold, ſilver, and precious ſtones; nor does it produce ſugar or ſpices, nor yet elephants, camels, &c. which we can do without; but produces abundance of corn, pulſe, fruits, animals, &c. the moſt neceſſary for the uſe of mankind. In general, it is better peopled and better cultivated than the other quarters; it is more full of cities, towns, and villages, great and ſmall, and its buildings are more ſolid and more commodious than thoſe of Africa and Aſia. The inhabitants are all white; and incomparably more handſome than the Africans, and even than moſt of the Aſiatics. The Europeans ſurpaſs both in arts and ſciences, eſpecially in thoſe called the *liberal*; in trade, navigation, and in military and civil affairs; being, at the ſame time, more prudent, more valiant, more generous, more polite, and more ſociable than they: and though we are divided into various ſects, yet, as Chriſtians, we have infinitely the advantage over the reſt of mankind. There are but few places in Europe where they ſell each other for ſlaves; and none where robbery is a profeſſion, as it is in Aſia and Africa.

There are ſeveral ſorts of governments in Europe; as the two empires of Germany and Ruſſia, the kingdoms of England, France, Spain, Portugal, Denmark, Sweden, Poland, Pruſſia, Sardinia, and the Two Sicilies. The commonwealths are Holland, Swiſſerland, Venice, Genoa, Raguſa, Lucca, and Geneva. The dukedoms, Tuſcany, Savoy, Modena, Mantua, Parma, and Courland, &c.

There are five ſorts of religions in Europe, viz. the Mahommedan, which is profeſſed in Turkey in Europe; the Greek, of which there are many in the ſame parts, in all Muſcovy, and in ſeveral parts of Poliſh Ruſſia; the Roman Catholic in Spain, Portugal, France, and Italy; the Proteſtant, though with a conſiderable difference, in Great Britain, Denmark, Sweden, and Norway. There is a mixture of both the laſt, in Ireland, Swiſſerland, Germany, Poland, Hungary, and the Low Countries: beſides many Jews, and ſome idolaters in Lapland and the northern parts of Muſcovy.

There are three general languages in Europe: the Latin, of which the Italian, the French, and the Spaniſh, are dialects; the Teutonic, which is ſpoken, tho' differently, in Germany, Hungary, Denmark, Sweden, and Great Britain; the Sclavonic, which is ſpoken, tho' greatly diſguiſed, in Muſcovy, Poland, Bohemia, and Turky in Europe. There are ſome of leſs extent: as, the Greek; the Proper Hungarian; the Baſque; the Britiſh, which is ſpoken in Wales and Bretagne in France; the Iriſh; and the Laponic.

Europe may be divided into 11 great parts, including their dependencies: 1. Sweden; 2. Denmark and Norway; 3. Ruſſia; 4. Poland; 5. Germany; 6. France; 7. Spain; 8. Italy; 9. Turky in Europe; 10. Little Tartary; and, 11. The European iſlands, of which the chief are Great Britain and Ireland. The greateſt cities in Europe are, London, Paris, Amſterdam, Conſtantinople, Moſcow, and Rome.

EURYDICE, the wife of Orpheus. See ORPHEUS.

EURYTHYMI, in architecture, painting, and ſculpture, is a certain majeſty, elegance, and eaſineſs, appearing in the compoſition of divers members, or parts of a body, painting, or ſculpture, and reſulting from the fine proportion of it.

EUSDEN (Laurence), an Iriſh clergyman, rector of Coneſby in Lincolnſhire, and poet laureat after the death of Mr Rowe. His firſt patron was the eminent lord Halifax; whoſe poem, on the battle of the Boyne, he tranſlated into Latin, and dedicated to his lordſhip. He was eſteemed by the duke of Newcaſtle, who rewarded an epithalamium he wrote on his marriage, with the place of poet laureat. He was the author of many poetical pieces, though but little known before his preferment: he died in 1730.

EUSEBIUS, ſurnamed Pamphilus, a celebrated biſhop of Cæſarea in Paleſtine, and one of the moſt learned men of his time, was born in Paleſtine about the latter end of the reign of Gallienus. He was the intimate friend of Pamphilus the Martyr; and, after his death, took his name in honour to his memory. He was ordained biſhop of Cæſarea in 313. He had a conſiderable ſhare in the conteſt relating to Arius; whoſe cauſe he, as well as ſeveral other biſhops of Paleſtine, defended, being perſuaded that Arius had been unjuſtly perſecuted by Alexander biſhop of Alexandria. He aſſiſted at the council of Nice in 325; when he made a ſpeech to the emperor Conſtantine on his coming to the council, and was placed next him on his right hand. He was preſent at the council of Antioch, in which Euſtathius biſhop of that city was depoſed; but though he was choſen by the biſhop and people of Antioch to ſucceed him, he abſolutely refuſed it. In 335, he aſſiſted at the council of Tyre, held againſt Athanaſius; and at the aſſembly of biſhops at Jeruſalem, at the time of the dedication of the church there. By theſe biſhops he was ſent to the emperor Conſtantine to defend what they had done againſt Athanaſius; when he pronounced the panegyric made on that emperor during the public rejoicings in the beginning of the 30th year of his reign, which was the laſt of his life. Euſebius ſurvived the emperor but a ſhort time, for he died in 338. He wrote, 1. An Eccleſiaſtical Hiſtory, of which Valetius has given a good edition in Greek and Latin. 2. The life of Conſtantine. 3. A treatiſe againſt Hierocles. 4. *Chronicon.* 5. *Preparationes Evangelicæ.* 6. *De demonſtratione Evangelica*, of which there are but 10 books extant out of 20; and ſeveral other works, ſome of which are loſt.

EUSTACHIUS (Bartholomew), phyſician and anatomiſt at Rome, flouriſhed about the year 1550. His Anatomical Plates were diſcovered there in 1712, and publiſhed in 1714.

EUSTATHIANS, a name give to the Catholics of Antioch in the 4th century, on occaſion of their refuſal to acknowledge any other biſhop beſide S. Euſtathius, depoſed by the Arians.

The denomination was given them during the epiſcopate of Paulinus, whom the Arians ſubſtituted to S. Euſtathius, about the year 330, when they began to hold their aſſemblies apart. About the year 350, Leontius of Phrygia, called the *eunuch*, who was an Arian, and was put in the ſee of Antioch, deſired the Euſtathians to perform their ſervice in his church; which they accepting, the church of Antioch ſerved indifferently both the Arians and Catholics.

This, we are told, gave occaſion to two inſtitutions, which have ſubſiſted in the church ever ſince. The firſt was pſalmody in two choirs; though M. Baillet thinks, that if they inſtituted an alternate pſalmody between two choirs, it was between two Catholic choirs, and not by way of reſponſe to an Arian choir. The ſecond was the doxology, *Glory be to the Father, and the Son, and the Holy Ghoſt.* See Doxology.

This conduct, which ſeemed to imply a kind of communion with the Arians, gave great offence to abundance of Catholics, who began to hold ſeparate meetings; and thus formed the ſchiſm of Antioch. Upon this, the reſt, who continued to meet in the church, ceaſed to be called *Euſtathians*, and that appellation became reſtrained to the diſſenting party. S. Flavianus, biſhop of Antioch in 381, and one of his ſucceſſors, Alexander, in 482, brought to paſs a coalition, or reunion, between the Euſtathians and the body of the church of Antioch, deſcribed with much ſolemnity by Theodoret, *Eccl.* l. iii. c. 2.

EUSTATHIUS, biſhop of Theſſalonica, in the 12th century, under the reigns of the emperors Emanuel, Alexander, and Andronicus Comnenus. He was a very eminent grammarian; and wrote commentaries upon Homer, and Dionyſius the geographer. The beſt edition of his Commentaries on Homer is that of Rome, printed in Greek, in 1542, in four volumes, folio. His Commentaries on the Periegeſis of Dionyſius were printed by Mr Hudſon, at Oxford, in 1697, 8vo. Euſtathius appears to have been alive in the year 1194.

EUSTATIA, or St Eustatia, one of the Caribbee iſlands, belonging to the Dutch, and ſituated in W. Long. 62. 56. N. Lat. 17. 29. It is about 15 miles in compaſs; and is little elſe than a huge mountain, which formerly has, in all probability, been a volcano. Its ſituation is ſo ſtrong, that it has but one landing place; and that is fortified in ſuch a manner as to be almoſt impregnable. Tobacco is the chief product of the iſland, and that is cultivated to the very top of the pyramid, which terminates in a large plain ſurrounded with woods; but having a hollow in the middle, which ſerves as a large den for wild beaſts. No fewer than 5000 white people, and 15,000 negroes, ſubſiſt on this ſpot, where they rear hogs, kids, rabbits, and all kinds of poultry, in ſuch abundance, that they can ſupply their neighbours, after having ſerved themſelves.

The firſt Dutch colony ſent to this iſland conſiſted of about 1600 people. They were diſpoſſeſſed by the Engliſh from Jamaica in 1665. Soon after, the Dutch and French becoming confederates, the Engliſh were expelled in their turn. The French continued to hold a garriſon in the iſland till the treaty of Breda, when it was reſtored to the Dutch. Soon after the revolution, the French drove out the Dutch, and were in their turn driven out by the Engliſh under Sir Timothy Thornhill, with the loſs of no more than eight men killed and wounded, though the fort they took mounted 16 guns, and was in every other reſpect very ſtrong. Sir Timothy found it neceſſary, for the protection of the Dutch, to leave a ſmall Engliſh garriſon in the fort; but he granted the French no terms of capitulation, except for their lives and baggage. By the peace of Ryſwic, the entire property of this iſland was reſtored to the Dutch, who have ever ſince remained undiſturbed maſters of it.

EUSTYLE, in architecture, a ſort of building in which the pillars are placed at the moſt convenient diſtance one from another, the intercolumniations being juſt two diameters and a quarter of the column, except thoſe in the middle of the face, before and behind, which are three diameters diſtant.

EUTROPIUS (Flavius), a Latin author, in the 4th century, was ſecretary to Conſtantine the Great, and afterwards bore arms under the emperor Julian, and followed that prince in his expedition againſt the

Perſians. He wrote an Abridgment of the Roman Hiſtory, from the foundation of Rome to the reign of Valens; the beſt edition of which is that of Miſs Le Fevre, afterwards Madam Dacier, publiſhed at Paris for the uſe of the Dauphin, in 4to, in the year 1683.

Eutropius, a famous eunuch, who, in the reign of Arcadius, was raiſed to the moſt diſtinguiſhed poſts, and even to the conſulſhip; but rendered himſelf odious by his crimes and debaucheries, and had even the inſolence to threaten the empreſs Eudoxia with cauſing her to be divorced: but Gainas having demanded his head, he took ſanctuary in a church, which he had deprived of its immunities; when St Chryſoſtom ſaved him from the fury of the populace, and pronounced on that occaſion a ſermon, which is juſtly eſteemed a maſter-piece of eloquence. Eutropius was afterwards baniſhed to the iſland of Cyprus, and was beheaded at Chalcedon in 399.

EUTYCHES, a Conſtinopolitan abbot, who, contending with Neſtorius, fell into a new hereſy, affirming Chriſt to be one thing, and the Word another. His followers were called *Eutychians*. Being condemned in the ſynod of Conſtantinople, convened by Flavianus the biſhop, he appealed to the emperor. After which, by the aſſiſtance of Dioſcurus biſhop of Alexandria, and Chryſaphius, he obtained a ſynod at Epheſus, called *Laſtrica*, or *the Aſſembly of Thieves and Robbers*, wherein he got his hereſy to be approved. However, in the ſecond oecumenical council of Chalcedon, under Martian, his errors were a ſecond time condemned.

EUTYCHIANS, in church-hiſtory, heretics in the 5th century, who embraced the errors of the monk Eutyches. See Eutyches.

EUTYCHIUS, patriarch of Alexandria, lived about the ninth age; and wrote annals in the Arabic language, printed at Oxford in 1658, with a Latin verſion by Mr Pocock. Selden had printed ſomething of his before.

EUXINE or Black Sea, forms part of the boundary betwixt Europe and Aſia. It receives the Nieper, the Danube, and other large rivers; and extends from 28 to 40 degrees of E. Long. and from 40 to 46 of N. Lat. The ancients imagined this ſea to have been originally only a lake or ſtanding pool, which broke firſt into the Propontis, and then into the Egean, waſhing away by degrees the earth which firſt kept it within bounds, and formed the two channels of the Boſphorus Thracius and Helleſpont, now the *Dardanelles*.—It was anciently called the *Axenus*, ſuppoſed to be from Aſhkenaz the ſon of Gomer, who is ſaid to have ſettled near it. This original being forgot in length of time, the Greeks explained it by *inhoſpitable*, which the word *Axenos* literally ſignifies; and therefore, when they came to conſider the inhabitants of theſe coaſts as more civilized and hoſpitable, they changed the name into *Euxinus*, which it ſtill retains.

EWE, the Engliſh name of a female ſheep*.

EWRY, in the Britiſh cuſtoms, an office in the king's houſhold, to which belongs the care of the tablelinen, of laying the cloth, and ſerving up water in ſilver ewers after dinner.

EX officio, among lawyers, ſignifies the power a perſon has, by virtue of his office, to do certain acts without being applied to. Thus a juſtice of peace may *ex officio*, at his diſcretion, take ſurety of the peace, without complaint made by any perſon whatſoever.

There was formerly an oath *ex officio*, whereby a ſuppoſed offender was compelled in the eccleſiaſtical court to confeſs, accuſe, or clear himſelf of a crime; but this law is repealed.

Ex *Poſt Facto*, in law, ſomething done after another: thus an eſtate granted may be good by matter *ex poſt facto*, that was not ſo at firſt, as in caſe of election.

EXACERBATION. See Paroxysm.

EXACTION, in law, a wrong done by an officer, or a perſon in pretended authority, in taking a reward or fee that is not allowed by law.

A perſon guilty of exaction may be fined and impriſoned. It is often confounded with Extortion.

EXÆRESIS, in ſurgery, the operation of extracting or taking away ſomething that is hurtful to the human body.

EXAGGERATION, in rhetoric, a kind of hyperbole, whereby things are augmented or amplified, by ſaying more than the truth, either as to good or bad.

Exaggeration, in painting, a method by which the artiſt, in repreſenting things, changes them too much, or makes them too ſtrong, either in reſpect of the deſign or colouring. It differs from *caricaturing*, in that the latter perverts or gives a turn to the features of a face, &c. which they had not; whereas exaggeration only heightens or improves what they had.

EXAMINERS, in chancery, two officers of that court, who examine, upon oath, witneſſes produced in cauſes depending there, by either the complainant or defendant, where the witneſſes live in London or near it. Sometimes parties themſelves, by particular order, are examined. In the country, above twenty miles from London, on the parties joining in commiſſion, witneſſes are examined by commiſſioners, being uſually counſellors or attornies not concerned in the cauſe.

EXAMPLE, in rhetoric, denotes an imperfect kind of induction, or argumentation; whereby it is proved, that a thing which has happened on ſome other occaſion will happen again on the preſent one, from the ſimilitude of the caſes. As, "The war of the Thebans, againſt their neighbours the Phocians, was ruinous; conſequently, that of the Athenians againſt their neighbours, will likewiſe be fatal."

EXANTHEMA, among phyſicians, denotes any kind of efflorescence or eruption, as the meaſles, purple ſpots in the plague, or malignant fevers, &c.

EXARCH, in antiquity, an officer ſent by the emperors of the eaſt into Italy, in quality of vicar, or rather prefect, to defend that part of Italy which was yet under their obedience, and particularly the city of Ravenna, againſt the Lombards. The exarch reſided at Ravenna; which place, with Rome, was all that was left to the emperors of their Italian dominions. The firſt exarch was under Juſtin the younger, in the year 567, after Beliſarius and Narſes had driven the barbarians out of Italy. The laſt was Eutychius, defeated by Adolphus king of the Lombards in 752.

* See Ovis.

Excalceation ‖ Exchange.

EXCALCEATION, among the Hebrews, was a particular law, whereby a widow, whom her huſband's brother refuſed to marry, had a right to ſummon him to a court of juſtice; and, upon his refuſal, might excalceate him, that is, pull off one of his ſhoes, and ſpit in his face; both of them actions of great ignominy.

EXCELLENCY, a title anciently given to kings and emperors, but now to embaſſadors and other perſons who are not qualified for that of *highneſs*, and yet are to be elevated above the other inferior dignities.

EXCENTRIC, in geometry, a term applied to circles and ſpheres which have not the ſame centre, and conſequently are not parallel; in oppoſition to concentric, where they are parallel, having one common centre.

EXCENTRICITY, in aſtronomy, is the diſtance of the centre of the orbit of a planet from the centre of the ſun; that is, the diſtance between the centre of the ellipſis and the focus thereof.

EXCEPTION, ſomething reſerved, or ſet aſide, and not included in a rule.

It is become proverbial, that there is no rule without an *exception;* intimating, that it is impoſſible to comprehend all the particular caſes, under one and the ſame maxim. But it is dangerous following the exception, preferably to the rule.

EXCEPTION, in law, denotes a ſtop or ſtay to an action; and is either dilatory or peremptory, in proceedings at common law; but in chancery it is what the plaintiff alleges againſt the ſufficiency of an anſwer, &c.

An exception is no more than the denial of what is taken to be good by the other party, either in point of law or pleading. The counſel in a cauſe are to take all their exceptions to the record at one time, and before the court has delivered any opinion of it.

EXCERPTA, in matters of literature. See EXTRACT.

EXCESS, in arithmetic and geometry, is the difference between any two unequal numbers or quantities, or that which is left after the leſſer is taken from or out of the greater.

EXCHANGE, in a general ſenſe, a contract or agreement, whereby one thing is given or exchanged for another.

EXCHANGE, in commerce, is the receiving or paying of money in one country for the like ſome in another, by means of bills of exchange.

The ſecurity which merchants commonly take from one another when they circulate their buſineſs, is a bill of exchange, or a note of hand: theſe are looked upon as payment. See BILL, and *Mercantile* LAWS.

The punctuality of acquitting theſe obligations is eſſential to commerce; and no ſooner is a merchant's accepted bill proteſted, than he is conſidered as a bankrupt. For this reaſon, the laws of moſt nations have given very extraordinary privileges to bills of exchange. The ſecurity of trade is eſſential to every ſociety; and were the claims of merchants to linger under the formalities of courts of law when liquidated by bills of exchange, faith, confidence, and punctuality, would quickly diſappear, and the great engine of commerce would be totally deſtroyed.

Exchange.

A regular bill of exchange is a mercantile contract, in which four perſons are concerned, viz. 1. The drawer, who receives the value: 2. His debtor, in a diſtant place, upon whom the bill is drawn, and who muſt accept and pay it: 3. The perſon who gives value for the bill, to whoſe order it is to be paid: and, 4. The perſon to whom it is ordered to be paid, creditor to the third.

By this operation, reciprocal debts, due in two diſtant parts, are paid by a ſort of transfer, or permutation of debtors and creditors.

(A) in London is creditor to (B) in Paris, value 100 l. (C) again in London is debtor to (D) in Paris for a like ſum. By the operation of the bill of exchange, the London creditor is paid by the London debtor, and the Paris creditor is paid by the Paris debtor; conſequently, the two debts are paid, and no money is ſent from London to Paris, nor from Paris to London.

In this example, (A) is the drawer, (B) is the accepter, (C) is the purchaſer of the bill, and (D) receives the money. Two perſons here receive the money, (A) and (D); and two pay the money, (B) and (C); which is juſt what muſt be done when two debtors and two creditors clear accounts.

This is the plain principle of a bill of exchange. From which it appears, that reciprocal and equal debts only can be acquitted by them.

When it therefore happens, that the reciprocal debts of London and Paris (to uſe the ſame example) are not equal, there ariſes a balance on one ſide. Suppoſe London to owe Paris a balance, value 100 l. How can this be paid? Anſwer, It may either be done with or without the intervention of a bill.

With a bill, if an exchanger, finding a demand for a bill upon Paris for the value of 100 l. when Paris owes no more to London, ſends 100 l. to his correſpondent at Paris in coin, at the expence (ſuppoſe) of 1 l. and then, having become creditor on Paris, he can give a bill for the value of 100 l. upon his being repaid his expence, and paid for his riſk and trouble.

Or it may be paid without a bill, if the London debtor ſends the coin himſelf to his Paris creditor, without employing an exchanger.

This laſt example ſhews of what little uſe bills are in the payment of balances. As far as the debts are equal, nothing can be more uſeful than bills of exchange; but the more they are uſeful in this eaſy way of buſineſs, the leſs profit there is to any perſon to make a trade of exchange, when he is not himſelf concerned either as debtor or creditor.

When merchants have occaſion to draw and remit bills for the liquidation of their own debts, active and paſſive, in diſtant parts, they meet upon 'Change; where, to purſue the former example, the creditors upon Paris, when they want money for bills, look out for thoſe who are debtors to it. The debtors to Paris again, when they want bills for money, ſeek for thoſe who are creditors upon it.

This market is conſtantly attended by brokers, who relieve the merchant of the trouble of ſearching for thoſe he wants. To the broker every one communicates his wants, ſo far as he finds it prudent; and by going about among all the merchants, the broker diſcovers the ſide upon which the greater demand lies, for money, or for bills.

He who is the demander in any bargain, has conſtantly the diſadvantage in dealing with him of whom he demands. This is no where ſo much the caſe as in exchange, and renders ſecrecy very eſſential to individuals among the merchants. If the London merchants want to pay their debts to Paris, when there is a balance againſt London, it is their intereſt to conceal their debts, and eſpecially the neceſſity they may be under to pay them; from the fear that thoſe who are creditors upon Paris would demand too high a price for the exchange over and above par.

On the other hand, thoſe who are creditors upon Paris, when Paris owes a balance to London, are as careful in concealing what is owing to them by Paris, from the fear that thoſe who are debtors to Paris would avail themſelves of the competition among the Paris creditors, in order to obtain bills for their money, below the value of them, when at par. A creditor upon Paris, who is greatly preſſed for money at London, will willingly abate ſomething of his debt, in order to get one who will give him money for it.

From the operation carried on among merchants upon 'Change, we may diſcover the conſequence of their ſeparate and jarring intereſts. They are conſtantly intereſted in the ſtate of the balance. Thoſe who are creditors on Paris, fear the balance due to London; thoſe who are debtors to Paris, dread a balance due to Paris. The intereſt of the firſt is to diſſemble what they fear; that of the laſt, to exaggerete what they wiſh. The brokers are thoſe who determine the courſe of the day; and the moſt intelligent merchants are thoſe who diſpatch their buſineſs before the fact is known.

Now, how is trade in general intereſted in the queſtion, Who ſhall outwit, and who ſhall be outwitted, in this complicated operation of exchange among merchants?

The intereſt of trade and of the nation is principally concerned in the proper method of paying and receiving the balances. It is alſo concerned in preſerving a juſt equality of profit and loſs among all the merchants, relative to the real ſtate of the balance. Unequal competition among men engaged in the ſame purſuit, conſtantly draws along with it bad conſequences to the general undertaking; and ſecrecy in trade will be found, upon examination, to be much more uſeful to merchants in their private capacity, than to the trade they are carrying on.

Merchants endeavour to ſimplify their buſineſs as much as poſſible; and commit to brokers many operations which require no peculiar talents to execute. This of exchange is of ſuch a nature, that it is hardly poſſible for a merchant to carry on the buſineſs of his bills, without their aſſiſtance, upon many occaſions. When merchants come upon Change, they are ſo full of fear and jealouſies, that they will not open themſelves to one another, leſt they ſhould diſcover what they want to conceal. The broker is a confidential man, in ſome degree, between parties, and brings them together.

Beſides the merchants who circulate among themſelves their reciprocal debts and credits ariſing from their importation and exportation of goods, there is another ſet of merchants who deal in exchange; which is the importation and exportation of money and bills.

Were there never any balance on the trade of nations, exchangers and brokers would find little employment: reciprocal and equal debts would eaſily be tranſacted openly between the parties themſelves. No man feigns and diſſembles, except when he thinks he has an intereſt in ſo doing.

But when balances come to be paid, exchange becomes intricate; and merchants are ſo much employed in particular branches of buſineſs, that they are obliged to leave the liquidation of their debts to a particular ſet of men, who make it turn out to the beſt advantage to themſelves.

Whenever a balance is to be paid, that payment coſts, as we have ſeen, an additional expence to thoſe of the place who owe it, over and above the value of the debt.

If, therefore, this expence be a loſs to the trading man, he muſt either be repaid this loſs by thoſe whom he ſerves, that is, by the nation; or the trade he carries on will become leſs profitable.

Every one will agree, that the expence of high exchange upon paying a balance, is a loſs to a people, no way to be compenſated by the advantages they reap from enriching the few individuals among them who gain by contriving methods to pay it off; and if an argument is neceſſary to prove this propoſition, it may be drawn from this principle, *viz.* whatever renders the profit upon trade precarious or uncertain, is a loſs to trade in general: this loſs is the conſequence of high exchange; and although a profit does reſult from it upon one branch of trade, the exchange-buſineſs, yet that cannot compenſate the loſs upon every other.

We may, therefore, here repeat what we have ſaid above, that the more difficulty is found in paying a balance, the greater is the loſs to a nation.

The Courſe of Exchange.

The courſe of exchange is the current price betwixt two place, which is always fluctuating and unſettled, being ſometimes above and ſometimes below par, according to the circumſtances of trade.

When the courſe of exchange riſes above par, the country where it riſes may conclude for certain, that the balance of trade runs againſt them. The truth of this will appear, if we ſuppoſe Britain to import from any foreign place goods to the value of 100,000l. at par, and export only to the value of 80,000l. In this caſe, bills on the ſaid foreign place will be ſcarce in Britain, and conſequently will riſe in value; and after the 80,000l. is paid, bills muſt be procured from other places at a high rate to pay the remainder, ſo that perhaps 120,000l. may be paid for bills to diſcharge a debt of 100,000l.

Though the courſe of exchange be in a perpetual flux, and riſes or falls according to the circumſtances of trade; yet the exchanges of London, Holland, Hamburgh, and Venice, in a great meaſure regulate thoſe of all other places in Europe.

I. *Exchange with Holland.*

MONEY-TABLE.

		Par in Sterling.	s.	d.
8 Pennings, or 2 duytes,	make	1 groat or penny =	0	0.54
2 Groats, or 16 pennings,		1 ſtiver =	0	1.09
6 Stivers, or 12 pence,		1 ſchilling =	0	6.56
20 Schillings,		1 pound Flemiſh =	10	11.18
20 Stivers, or 40 pence,		1 guilder or florin =	1	9.86
6 Guilders, or florins,		1 pound Flemiſh =	10	11.18
2½ Guilders, or florins,		1 rixdollar =	4	6.66

In Holland there are two ſorts of money, bank and current. The bank is reckoned good ſecurity; demands on the bank are readily anſwered; and hence bank-money is generally rated from 3 to 6 *per cent.* better than the current. The difference between the bank and current money is called the *agio*.

Bills on Holland are always drawn in bank-money; and if accounts be ſent over from Holland to Britain in current money, the Britiſh merchant pays theſe accounts by bills, and in this caſe has the benefit of the agio.

Prob. I. *To reduce bank-money to current money.*

Rule. As 100 to 100+agio, ſo the given guilders to the anſwer.

Example. What will 2210 guilders in bank-money amount to in Holland currency, the agio being 3⅛ *per cent.?*

```
                    Guild.
As 100 : 103⅛ :: 2210
     8      8     825
   ———    ———    ————
   800    825    11050
                 4420
                17680
             ————————Guild.  ſt.  pen.
        8|00)18232|50(2279    1    4 cur.
             16···20
             ————  ————
               22  10|00(
               16   8
               ——   —
               63   2
               56  16
               ——  ——
               72  32
               72  32
               ——  ——
```

Or, by practice,

```
50)2210
      44.2    = 2 per cent.
      22.1    = 1 per cent.
       2.7625 = ⅛ per cent.
   ——————————
    2279.0625
```

If the agio only be required, make the agio the middle term, thus:

```
                  Guil. ſt. pen.
As 100 : 3⅛ :: 2210 : 69   1   4 agio.
```

Or, work by practice, as above.

Prob. II. *To reduce current money to bank-money.*

Rule. As 100+agio to 100, ſo the given guilders to the anſwer.

Example. What will 2279 guilders 1 ſtiver 4 pennings, Holland currency, amount to in bank-money, the agio being 3⅛ *per cent?*

```
  Guild.     Guild.    Guild. ſt. pen.
As 103⅛  :    100  ::  2279    1   4
      8         8        20
   ————      ————     —————
    825       800     45581
     20                  16
  —————               ——————
  16500               273490
   16                 45581
  —————               ——————
    990               729300
   165                   800
  —————              ————————
8)264|000           8)583440|000
 3)33                 3)72930Guild.
   11                11)24310(2210 bank.
```

In Amſterdam, Rotterdam, Middleburgh, &c. books and accounts are kept by ſome in guilders ſtivers and pennings, and by others in pounds ſhillings and pence Flemiſh.

Britain gives 1 l. Sterling for an uncertain number of ſhillings and pence Flemiſh. The par is 1 l. Sterling for 36.59 s. Flemiſh; that is, 1 l. 16 s. 7.08 d. Flemiſh.

When the Flemiſh rate riſes above par, Britain gains and Holland loſes by the exchange, and *vice verſa*.

Sterling money is changed into Flemiſh, by ſaying.
As 1 l. Sterling to the given rate,
So is the given Sterling to the Flemiſh ſought.

Or, the Flemiſh money may be caſt up by practice.

Dutch money, whether pounds, ſhillings, pence Flemiſh, or guilders, ſtivers, pennings, may be changed into Sterling, by ſaying,

As the given rate to 1 l. Sterling,
So the given Dutch to the Sterling ſought.

Example. 1. A merchant in Britain draws on Amſterdam for 782l. Sterling: How many pounds Flemiſh, and how many guilders, will that amount to, exchange at 34s. 8d. *per* pound Sterling?

```
                                 Decimally.
   L.  s. d.   L.           L.    s.       L.
If 1 : 34  8 :: 782     If 1 : 34.6 :: 782
       12                          782
      ----                        -----
      416                          693
      782                        27733
      ----                      242666
      832                       ------ ----
     3328                    2|0)2710|9.3
    2912                        ------ ----
   ------                    L.1355  9 4 Flem.
12)325312
   ------ d.
2|0) 2710|9 4
     ---- ----
L. 1355  9 4 Flem.
```

```
By practice.                      Or thus:
               L.   s. d.                    L.  s. d.
              782                           782
10s. = 1/2    391             14s. = 7/10   547  8
 4s. = 1/5    156  8           8d. = 1/30    26  1 4
 8d. = 1/6     26  1  4                     ---------
              ---- ----                     13559 4 Fl.
             1355  9 4 Fl.
```

Multiply the Flemiſh pounds and ſhillings by 6, and the product will be guilders and ſtivers; and if there be any pence, multiply them by 8 for pennings; or, divide the Flemiſh pence by 40, and the quot will be guilders, and the half of the remainder, if there be any, will be ſtivers, and one penny odd will be half a ſtiver, or 8 pennings, as follows,

```
 L.       s. d.
1355      9 4                 Flem. pence.
          6            4|0)32531|2(32 rem.
 -------------          ----------------
Guild.8132 16 ſtiv.     Guild. 8132  16 ſtiv.
```

2. Change 591l. 5s. Flemiſh into Sterling money, exchange at 37s. 6d. Flemiſh *per* l. Sterling?

```
 Flem.  Ster.   Flem.
 s.  d.  L.     L.   s.
If 37 6 : 1 :: 591   5
    2               20
   --           -------
 5)75            11025
   --                2
 4)15           -------
   --        5)23650
    3          -------
             5) 4730
               -------
             3)  946
               -------
 L.  s. d.       315 1/2
Anſ. 315 5 8 Ster.
```

```
           Decimally.
   5) L.     L.   5) L.
If 1.875  :  1 :: 591.25
   -----           ------
5) .375          5)118.25
5) .075          5) 23.65
   .015     .015)  4.73(313.3
                   45
                   --
                    23
                    15
                    --
                     80
                     75
                     --
                      50
                      45
                      --
                     * 5
```

Holland exchanges with other nations as follows, *viz.* with

		Flem. d.
Hamburgh, on the dollar,	=	$66\frac{2}{3}$
France, on the crown,	=	54
Spain, on the ducat,	=	$109\frac{4}{5}$
Portugal, on the cruſade,	=	50
Venice, on the ducat,	=	93
Genoa, on the pezzo,	=	100
Leghorn, on the piaſtre,	=	100
Florence, on the crown,	=	120
Naples, on the ducat,	=	$74\frac{2}{3}$
Rome, on the crown,	=	136
Milan, on the ducat,	=	102
Bologna, on the dollar,	=	$94\frac{4}{9}$

Exchange between Britain and Antwerp, as alſo the Auſtrian Netherlands, is negociated the ſame way as with Holland; only the par is ſomewhat different, as will be deſcribed in article 2d, following.

II. *Exchange with Hamburgh.*

MONEY-TABLE.

			Par in Sterling.		s.	d.
12	Phennings	make	1 ſchilling-lub	=	0	$1\frac{1}{8}$
16	Schilling-lubs		1 mark	=	1	6
2	Marks		1 dollar	=	3	0
3	Marks		1 rixdollar	=	4	6
$6\frac{1}{4}$	Marks		1 ducat	=	9	$4\frac{1}{2}$

Books and accounts are kept at the bank, and by moſt people in the city, in marks, ſchilling-lubs, and phennings; but ſome keep them in pounds, ſchillings, and groots Flemiſh.

The agio at Hamburgh runs between 20 and 40 *per cent.* All bills are paid in bank-money.

Hamburgh exchanges with Britain by giving an uncertain number of ſchillings and groots Flemiſh for the pound Sterling. The groot or penny Flemiſh here, as alſo at Antwerp, is worth $\frac{54}{96}$ of a penny Sterling; and ſo ſomething better than in Holland, where it is only $\frac{54}{100}$d. Sterling.

6. Phen-

		Flemiſh.
6 Phennings	make	1 groot or penny
6 Schilling-lubs		1 ſchilling
1 Schilling-lub		2 pence or groots
1 Mark		32 pence or groots
$7\frac{1}{2}$ Marks		1 pound.

The par with Hamburgh, and alſo with Antwerp, is 35s. $6\frac{2}{3}$d. Flemiſh for 1 l. Sterling.

Examples. 1. How many marks muſt be received at Hamburgh for 300l. Sterling, exchange at 35s. 3d. Flemiſh *per* l. Sterling.

```
   L.  s. d.    L.
If 1 : 35 3 :: 300
        12
      ----
       423
        300
      ------ M.  ſch.
32)126900(3965 10
    96...
    ----
     309
     288
     ----
      210
      192
      ----
       180
       160
       ----
       (20)
        16
       ----
       )320
        32
       ----
        (0)
```

Decimally.

```
Flem. s. Marks. Flem. s.
If 20 : 7.5 :: 35.25
      4 : 1.5 :: 35.25
                   1.5
                ------
                 17625
                 3525
                ------
              4)52.875
                -------
Marks in 1l. Sterling     13.21875
                               300
                          ----------
Marks in 300l. Sterling   3965.62500
                                 16
                              -----
                               3750
                               625
                              -----
          Schilling-lubs 10.000
```

2. How much Sterling money will a bill of 3965 mark 10 ſchilling-lubs amount to, exchange at 35s. 3d. Flemiſh *per* l. Sterling?

```
Fl.s.  d.  L.St. Mks.  ſch.
If 35   3 : 1 :: 3965   10
   12               32   2
  ---             ----  --
  423             7930  20d.
                 11897
                 -----
            423)126900(300l. ſter.
                1269
                ----
```

Decimally.

```
4 : 1.5 :: 35.25
             1.5
          ------
           17625
           2525
          ------
        4)52.875(13.21875
13.21875)3965.62500(300l. ſter.
         3965625
         -------
```

III. *Exchange with France.*

MONEY-TABLE.

			Par in Ster. s.	d.
12 deniers	make	1 ſol	= 0	$0\frac{39}{80}$
20 ſols		1 livre	= 0	$9\frac{3}{4}$
3 livres		1 crown	= 2	$5\frac{1}{4}$

At Paris, Rouen, Lyons, &c. books and accounts are kept in livres, ſols, and deniers; and the exchange with Britain is on the crown, or ecu, of 3 livres, or 60 ſols Tournois. Britain gives for the crown an uncertain number of pence, commonly between 30 and 34, the par, as mentioned above, being $29\frac{1}{4}$d.

Examp. 1. What Sterling money muſt be paid in London to receive in Paris 1978 crowns 25 ſols, exchange at $31\frac{5}{8}$d. *per* crown!

```
    Sols.  d.     Cr.  ſols.
If 60 : 31⅝ :: 1978   25
        ---         60
        253     ------
                118705
                   253
                ------
                356115
               593525
              237410
              --------
        6|0)3003236|5  Rem.
            ---------
          8)500539     3
            --------
         12)62567      11
            ------
        2|0)521|3      13
            -------
         L.260 13 11⅜  Anſ.
```

By Practice.

d.		*Cr.*	*Sols.*	
		1978	25, at $31\frac{5}{8}$d.	
30 = $\frac{1}{8}$		247	5	0
$1\frac{1}{2}$ = $\frac{1}{20}$		12	7	3
$\frac{1}{8}$ = $\frac{1}{12}$		1	0	$7\frac{1}{4}$
Sols 20 = $\frac{1}{3}$		0	0	$10\frac{1}{2}$
5 = $\frac{1}{4}$		0	0	$2\frac{1}{4}$
		260	13	$11\frac{1}{4}$

If you work decimally, ſay,

Cr. *d. Ster.* *Cr.* *d. Ster.*
As 1 : 31.625 :: 1978.416 : 62567.427083

2. How many French livres will L.121 : 18 : 6 Sterling amount to, exchange at $32\frac{7}{8}$d. *per* crown?

d. *Liv.* *L.* *s.* *d.*
If $32\frac{7}{8}$: 3 :: 121 18 6
8 20
263 24 2438
12
29262
24
117048
58524
Liv. *ſols.* *den.*
263)702288(2670 5 11 *Anſ.*
Rem. (78 = 5 ſols 11 deniers.

IV. *Exchange with Portugal.*

MONEY-TABLE.

		Par in Ster.		s.	d.	f.
		1 ree	=	0	0	0.27
400 rees	make	1 cruſade	=	2	3	
1000 rees	make	1 millree	=	5	$7\frac{1}{2}$	

In Liſbon, Oporto, &c. books and accounts are generally kept in rees and millrees; and the millrees are diſtinguiſhed from the rees by a mark ſet between them thus, 485 ♆ 372; that is, 485 millrees and 372 rees.

Britain, as well as other nations, exchanges with Portugal on the millree; the par, as in the table, being $67\frac{1}{2}$d. Sterling. The courſe with Britain runs from 63d. to 68d. Sterling *per* millree.

Epamples. 1. How much Sterling money will pay a bill of 827 ♆ 160 rees, exchange at $63\frac{3}{8}$d. Sterling *per* millree?

Rees. *d.* *Rees.*
If 1000 : $63\frac{3}{8}$ :: 827.160
8 507
8000 507 579012
413580
Rem.
8000)419370.120 2
12) 52421 — 5d.
20) 4368 — 8s.
L. 218 8 $5\frac{1}{4}$ *Anſ.*

By Practice.

d.	*Rees.*
	827.160, at $63\frac{3}{8}$d.
60 = $\frac{1}{4}$	206.790
3 = $\frac{1}{20}$	10.3395
$\frac{2}{8}$ = $\frac{1}{12}$	.861625
$\frac{1}{8}$ = $\frac{1}{2}$	.4308125
	218.4219375

The rees being thouſandth-parts of the millrees, are annexed to the integer, and the operation proceeds exactly as in decimals.

2. How many rees of Portugal will 500l. Sterling amount to, exchange at 5s. $4\frac{5}{8}$d. *per* millree?

d. *Rees.* *L.*
If $64\frac{5}{8}$: 1000 :: 500
8 20
517 8000 10000
12
120000
8000
Rees.
517)960000000(1856.866 *Anſ.*

V. *Exchange with Spain.*

MONEY-TABLE.

		Par in Ster.		s.	d.
34 mervadies	make	1 rial	=	0	$5\frac{3}{8}$
8 rials	make	1 piaſtre	=	3	7
375 mervadies	make	1 ducat	=	4	$11\frac{1}{4}$

In Madrid, Bilboa, Cadiz, Malaga, Seville, and moſt of the principal places, book and accounts are kept in piaſtres, called alſo *dollars*, rials, and mervadies; and they exchange with Britain generally on the piaſtre, and ſometimes on the ducat. The courſe runs from 35d. to 45d. Sterling for a piaſtre or dollar of 8 rials.

Examp. 1. London imports from Cadiz, goods to the value of 2163 piaſtres and 4 rials: How much Sterling will this amount to, exchange at $38\frac{3}{8}$d. Sterling *per* piaſtre?

d.	*Piaſt.*	*Rials.*	
	2163	4, at $38\frac{3}{8}$d.	
24 = $\frac{1}{10}$	216	6	
12 = $\frac{1}{2}$	108	3	
2 = $\frac{1}{6}$	18	0	6
$\frac{2}{8}$ = $\frac{1}{8}$	2	5	$0\frac{3}{4}$
$\frac{1}{8}$ = $\frac{1}{2}$	1	2	$6\frac{3}{8}$
	345	17	$1\frac{1}{8}$
		1	$7\frac{3}{16}$
L.	345	18	$8\frac{5}{16}$ *Anſ.*

Rials.	*d.*
	$38\frac{3}{8}$ each.
4 =	$19\frac{3}{16}$

2. London remits to Cadiz 345l. 18s. $8\frac{5}{16}$d. How much Spaniſh money will this amount to, exchange at $38\frac{3}{8}$d. Sterling *per* piaſtre?

If

```
   d. Piaſt. L.   s. d.
If 38 3/8 : 1 :: 345 18 8 5/16
   ——         20
  307       ————      614)1328389(2163 piaſtres.
    2       6918          1228 ···
  ———         12          ————
  614       ————           1003
           83024            614
              16           ————
           ——————          3898
          498149           3684
           83024           ————
         ———————            2149
Carried up 1328389          1842
                            ————
                             307
                               8
                            ————
   Piaſt. Rials.      614)2456(4 rials.
Anſ. 2163   4             2456
                          ————
```

VI. *Exchange with Venice.*

MONEY-TABLE.

$$\left.\begin{array}{l}5\frac{1}{6}\ \text{Soldi}\\ 24\ \text{Gros}\end{array}\right\}\text{make}\left\{\begin{array}{l}1\ \text{gros}\\ 1\ \text{ducat}=50\frac{1}{4}\text{d. Sterling.}\end{array}\right.$$

The money of Venice is of three ſorts, *viz.* two of bank money, and the picoli money. One of the banks deals in banco money, and the other in banco current. The bank money is 20 *per cent.* better than the banco current, and the banco current 20 *per cent.* better than the picoli money. Exchanges are always negociated by the ducat banco, the par being 4s. $2\frac{1}{4}$d. Sterling, as in the table.

Though the ducat be commonly divided into 24 gros, yet bankers and negotiators, for facility of computation, uſually divide it as follows, and keep their books and accounts accordingly.

$$\left.\begin{array}{l}12\ \text{Deniers d'or}\\ 20\ \text{Sols d'or}\end{array}\right\}\text{make}\left\{\begin{array}{l}1\ \text{ſol d'or}\\ 1\ \text{ducat}=50\frac{1}{4}\text{d. Sterling.}\end{array}\right.$$

The courſe of exchange is from 45d. to 55d. Sterling *per* ducat.

Examp. 1. How much Sterling money is equal to 1459 ducats 18 ſols 1 denier, bank money of Venice, exchange at $52\frac{3}{4}$d. Sterling *per* ducat?

```
Duc. d.        Duc. ſol. den.                     d.
If 1 : 52 3/4 :: 1459 18  1                   |  52 3/4 rate.
               52 3/4              Sols.      |  ——————
             ————————               10 = 1/2  |  26 3/8
               2918                  5 = 1/2  |  13 1/8
               7295                  2 = 1/5  |   5 2/8
             ————————                1 = 1/2  |   2 5/8
       d.     75868            den.  1 = 1/12 |   0 2/8
      1/2 =   729 4/8                            ——————
      1/4 =   364 6/8                             47 5/8
             ————————
             76962 2/8
                47 5/8
         ———————————— Rem.
         12)77010(6d.
          ——————
         2|0)641|7(17s.
           ——————
      L. 320   17   6 Sterling.  Anſ.
```

2. How many ducats at Venice are equal to 385l. 12s. 6d. Sterling, exchange at 4s. 4d. *per* ducat?

```
     L.     Duc.    L.
  If .216 : 1 :: 385.625
          .216)385.625
            21  385625
        ——————————————— Duc.
        195)347062.5(1779.8   Anſ.
            195
            ———
            1520
            1365
            ————
             1556
             1365
             ————
              1912
              1755
              ————
               1575
               1560
               ————
               (15)
```

Bank money is reduced to current money, by allowing for the agio, as was done in exchange with Holland; *viz.* ſay, As 100 to 120, or as 10 to 12, or as 5 to 6, ſo the given bank money to the current ſought. And current money is reduced to bank money by reverſing the operation. And in like manner may picoli money be reduced to current or to bank money, and the contrary.

100 ducats banco of Venice.

In Leghorn	=93 pezzos	In Lucca	= 77 crowns
In Rome	$=68\frac{1}{2}$ crowns	In Francfort	$=139\frac{1}{2}$ florins

VII. *Exchange with Genoa.*

MONEY-TABLE.

$$\left.\begin{array}{l}12\ \text{Denari}\\ 20\ \text{Soldi}\end{array}\right\}\text{make}\left\{\begin{array}{lll}1\ \text{ſoldi} & \textit{s.} & \textit{d.}\\ 1\ \text{pezzo}= & 4 & 6\ \text{Sterling.}\end{array}\right.$$

Books and accounts are generally kept in pezzos, ſoldi, and denari: but ſome keep them in lires, ſoldi, and denari; and 12 ſuch denari make 1 ſoldi, and 20 ſoldi make 1 lire.

The pezzo of exchange is equal to $5\frac{3}{4}$ lires; and, conſequently, exchange money is $5\frac{3}{4}$ times better than the lire money. The courſe of exchange runs from 47d. to 58d. Sterling *per* pezzo.

Examp. How much Sterling money is equivalent to 3390 pezzos 16 ſoldi, of Genoa, exchange at $51\frac{7}{8}$d. Sterling *per* pezzo?

```
   Soldi.  d.       Pez.  ſoldi.
   If 20 : 51 7/8 :: 3390  16
       8   ——————        20
    ———     415       ——————
    160               67816
                        415
                     ———————
                     339080
                     67816
                    271264
                   ————————        d.        L.   s.  d.
          160)28143640(175897 3/4=732  18  1 3/4
```

If Sterling money be given, it may be reduced or changed into pezzos of Genoa, by reverſing the former operation.

Exchange money is reduced to lire money, by being multiplied by $5\frac{3}{4}$, as follows:

	Pez.	*ſoldi.*	Decimally.
	3390	16	3390.8
		$5\frac{3}{4}$	5·75
	16954	0	169540
$\frac{1}{2}$ =	1695	8	237356
$\frac{1}{4}$ =	847	14	169540
Lires	19497	2	Lires 19497·100

And lire money is reduced to exchange money by dividing it by $5\frac{3}{4}$

In Milan, 1 crown = 80
In Naples, 1 ducat = 86
In Leghorn, 1 piaſtre = 20
In Sicily, 1 crown = $127\frac{2}{9}$

VIII. *Exchange with Leghorn.*

MONEY-TABLE.

12 Denari } make { 1 ſoldi *s.* *d.*
20 Soldi } make { 1 piaſtre = 4 6 *Ster.*

Books and accounts are kept in piaſtres, ſoldi, and denari. The piaſtre here conſiſts of 6 lires, and the lire contains 20 ſoldi, and the ſoldi 12 denari, and conſequently exchange money is 6 times better than lire money. The courſe of exchange is from 47 d. to 58 d. Sterling *per* piaſtre.

Example. What is the Sterling value of 731 piaſtres, at $55\frac{1}{2}$ d. each.

s. *d.*	731 piaſtres, at $55\frac{1}{2}$ d.		
4 or 48 = $\frac{1}{5}$	146	4	
6 = $\frac{1}{8}$	18	5	6
$1\frac{1}{2}$ = $\frac{1}{4}$	4	11	$4\frac{1}{2}$
	L. 169	0	$10\frac{1}{2}$ *Anſ.*

Sterling money is reduced to money of Leghorn, by reverſing the former operation; and exchange money is reduced to lire money by multiplying by 6, and lire money to exchange money by dividing by 6.

100 piaſtres of Leghorn are
In Naples = 134 ducats. | In Geneva = $185\frac{1}{3}$ crowns.

Soldi of Leghorn.

In Sicily, 1 crown = $133\frac{1}{3}$
In Sardinia, 1 dollar = $95\frac{5}{9}$

The above are the chief places in Europe with which Britain exchanges directly; the exchanges with other places are generally made by bills on Hamburgh, Holland, or Venice. We ſhall here, however, ſubjoin the par of exchange betwixt Britain and moſt of the other places in Europe with which ſhe has any commercial intercourſe.

		Par in Sterling	*L.*	*s.*	*d.*
Rome	1	crown =		6	$1\frac{2}{3}$
Naples,	1	ducat =		3	$4\frac{1}{2}$
Florence,	1	crown =		5	$4\frac{5}{8}$
Milan,	1	ducat =		4	7
Bologna	1	dollar =		4	3
Sicily,	1	crown =		5	0
Vienna	1	rixdollar =		4	8
Auſburgh,	1	florin =		3	$1\frac{1}{3}$
Francfort,	1	florin =		3	0
Bremen	1	rixdollar =		3	6
Breſlau,	1	rixdollar =		3	3
Berlin,	1	rixdollar =		4	0
Stetin,	1	mark =		1	6
Embden	1	rixdollar =		3	6
Bolſenna	1	rixdollar =		3	8
Dantzic,	$13\frac{1}{2}$	florins =	1	0	0
Stockholm,	$34\frac{4}{7}$	dollars =	1	0	0
Ruſſia,	1	ruble =		4	5
Turkey,	1	aſper =		4	6

The following places, *viz.* Switzerland, Nuremburgh, Leipſic, Dreſden, Oſnaburgh, Brunſwic, Cologn, Leige, Straſburgh, Cracow, Denmark, Norway, Riga, Revil, Narva, exchange with Britain, when direct exchange is made, upon the rixdollar, the par being 4 s. 6 d. Sterling.

IX. *Exchange with America and the Weſt Indies.*

In North America and the Weſt Indies, accounts, as in Britain, are kept in pounds, ſhillings, and pence. In North America they have few coins circulating among them, and on that account have been obliged to ſubſtitute a paper-currency for a medium of their commerce; which having no intrinſic value, is ſubjected to many diſadvantages, and generally ſuffers a great diſcount. In the Weſt Indies coins are more frequent, owing to their commercial intercourſe with the Spaniſh ſettlements.

Exchange betwixt Britain and America, or the Weſt Indies, may be computed as in the following examples:

1. The neat proceeds of a cargo from Britain to Boſton amount to 845 l. 17 s. 6 d. currency: How much is that in Sterling money, exchange at 80 *per cent.?*

			L.	*s.*	*d.*
If 180 :	100				
18 :	10				
9 :	5	::	845	17	6
					5
			9)4229	7	6
			L. 469	18	$7\frac{1}{3}$ Ster. *Anſ.*

2. Boſton remits to Britain a bill of 469 l. 18 s. $7\frac{1}{3}$ d. Sterling: How much currency was paid for the bill at Boſton, exchange at 80 *per cent.?*

			L.	*s.*	*d.*
If 100 :	180				
5 :	9	::	469	18	$7\frac{1}{3}$
					9
			5)4229	7	6
			845	17	6 currency. *Anſ.*

3. How much Sterling money will 1780 l. Jamaica currency amount to, exchange at 40 *per cent.?*

			L.	*s.*	*d.*
If 140 :	100				
14 :	10				
7 :	5	::	1780		
			5		
			7)8900		
			1271	8	$6\frac{3}{4}$ Ster. *Anſ.*

Bills of exchange from America, the rate being high, is an expenſive way of remitting money to Britain; and therefore merchants in Britain generally chooſe to have the debts due to them remitted home in ſugar, rum, or other produce.

X.

X. *Exchange with Ireland.*

At Dublin, and all over Ireland, books and accounts are kept in pounds, ſhillings, and pence, as in Britain; and they exchange on the 100l. Sterling.

The par of one ſhilling Sterling is one ſhilling and one penny Iriſh: and ſo the par of 100l. Sterling is 108l. 6s. 8d. Iriſh. The courſe of exchange runs from 6 to 15 *per cent.*

Examp. 1. London remits to Dublin 586l. 10s. Sterling: How much Iriſh money will that amount to, exchange at $9\frac{5}{8}$ *per cent.?*

L

If 100 : $109\frac{5}{8}$ :: 586.5
8 877

800 : 877 41055
41055
46920

800)514360.5

642.950625

Anſ. 642l. 19s. Iriſh.

By practice.

p. cent.	586.5
10 = $\frac{1}{10}$	58.65
2 = $\frac{1}{5}$	11.73 ſub.
8 =	46.92
1 = $\frac{1}{8}$	5.865
$\frac{4}{8}$ = $\frac{1}{2}$	2.9325
$\frac{1}{8}$ = $\frac{1}{4}$	.733125
$9\frac{5}{8}$	56.450625 add.
	642.950625

2. How much Sterling will 625l. Iriſh amount to, exchange at $10\frac{3}{8}$ *per cent.?*

If $110\frac{1}{8}$: 100 :: 625
8 800

L. s. d.

883 800 883)500000(566 5 $0\frac{1}{4}$ Ster. *Anſ.*

XI. *Exchange betwixt London and other places in Britain.*

The ſeveral towns in Britain exchange with London for a ſmall premium in favour of London; ſuch as, 1, $1\frac{1}{4}$, &c. *per cent.* The premium is more or leſs, according to the demand for bills?

Examp. Edinburgh draws on London for 860l. exchange at $1\frac{3}{8}$ *per cent.*: How much money muſt be paid at Edinburgh for the bill?

per cent.	*L.* 860
1 = $\frac{1}{100}$	8 12
$\frac{2}{8}$ = $\frac{1}{4}$	2 3
$\frac{1}{8}$ = $\frac{1}{2}$	1 1 6
	11 16 6 premium.
	817 16 6 paid for the bill.

To avoid paying the premium, it is an uſual practice to take the bill payable at London a certain number of days after date; and in this way of doing, 73 days is equivalent to 1 *per cent.*

XII. *Arbitration of Exchanges.*

The courſe of exchange betwixt nation and nation naturally riſes or falls according as the circumſtances and balance of trade happen to vary. Now to draw upon and remit to foreign places, in this fluctuating ſtate of exchange, in the way that will turn out moſt profitable, is the deſign of arbitration. Which is either ſimple or compound.

I. *Simple Arbitration.*

In ſimple arbitration the rates or prices of exchange from one place to other two are given; whereby is found the correſpondent price between the ſaid two places, called the *arbitrated price*, or *par of arbitration:* and hence is derived a method of drawing and remitting to the beſt advantage.

Examp. 1. If exchange from London to Amſterdam be 33s. 9d. *per* l. Sterling; and if exchange from London to Paris be 32d. *per* crown; what muſt be the rate of exchange from Amſterdam to Paris, in order to be on a par with the other two?

Ster. *Flem.* *Ster.*
s. *s.* *d.* *d.*
If 20 : 33 9 :: 32
12 12

240 405
32

810
1215

240)12960(54d. Flem. *per* crown. *Anſ.*

2. If exchange from Paris to London be 32d. Sterling *per* crown; and if exchange from Paris to Amſterdam be 54d. Flemiſh *per* crown; what muſt be the rate of exchange between London and Amſterdam, in order to be on a par with the other two?

Ster. *Flem.* *Ster.*
d. *d.* *d.*
If 32 : 54 :: 240
240

216
108

12) *s.* *d.*
32)12960(405 (33 9 Flem. *per* l. Ster. *Anſ.*

From theſe operations it appears, that if any ſum of money be remitted, at the rates of exchange mentioned, from any one of the three places to the ſecond, and from the ſecond to the third, and again from the third to the firſt, the ſum ſo remitted will come home entire, without increaſe or diminution.

From the par of arbitration thus found, and the courſe of exchange given, is deduced a method of drawing and remitting to advantage, as in the following example.

3. If exchange from London to Paris be 32 d. Sterling *per* crown, and to Amſterdam 405 d. Flemiſh *per* l. Sterling; and if, by advice from Holland to France, the courſe of exchange between Paris and Amſterdam is fallen to 52 d. Flemiſh *per* crown; what may be gained *per cent.* by drawing on Paris, and remitting to Amſterdam?

The par of arbitration between Paris and Amſterdam in this caſe, by Ex. 1. is 54 d. Flemiſh *per* crown. Work as under.

d. St. Cr. L. St. Cr.
If 32 : 1 :: 100 : 750 debit at Paris
Cr. d. Fl. Cr. d. Fl.
If 1 : 52 :: 750 : 39000 credit at Amſterdam.
d.Fl. L.St. d. Fl. L. s. d.Ster.
If 405 : 1 :: 39000 : 96 5 $11\frac{1}{9}$ to be remitted.
100
3 14 $0\frac{8}{9}$

But if the courſe of exchange between Paris and Amſterdam, inſtead of falling below, riſe above the par of arbitration, ſuppoſe to 56 d. Flemiſh *per* crown; in this caſe, if you propoſe to gain by the negotiation, you muſt draw on Amſterdam, and remit to Paris. The computation follows.

L. St. d. Fl. L. St. d. Fl.
If 1 : 405 :: 100 : 40500 debit at Amſterdam.
d. Fl. Cr. d. F. Cr.
If 56 : 1 :: 40500 : $723\frac{3}{14}$ credit at Paris.
Cr. d.St. Cr. L. s. d. Ster.
If 1 : 32 :: $723\frac{3}{14}$: 96 8 $6\frac{6}{7}$ to be remitted.
100
3 11 $5\frac{1}{7}$ gained *per cent.*

In negotiations of this ſort, a ſum for remittance is afforded out of the ſum you receive for the draught; and your credit at the one foreign place pays your debt at the other.

II. *Compound Arbitration.*

In compound arbitration the rate or price of exchange between three, four, or more places, is given, in order to find how much a remittance paſſing through them all will amount to at the laſt pace; or to find the arbitrated price, or par of arbitration, between the firſt place and the laſt. And this may be done by the following

Rules. I. Diſtinguiſh the given rates or prices into antecedents and conſequents; place the antecedents in one column, and the conſequents in another on the right, fronting one another by way of equation.

II. The firſt antecedent, and the laſt conſequent to which an antecedent is required, muſt always be of the ſame kind.

III. The ſecond antecedent muſt be of the ſame kind with the firſt conſequent, and the third antecedent of the ſame kind with the ſecond conſequent, &c.

IV. If to any of the numbers a fraction be annexed, both the antecedent and its conſequent muſt be multiplied into the denominator.

V. To facilitate the operation, terms that happen to be equal or the ſame in both columns, may be dropped or rejected, and other terms may be abridged.

VI. Multiply the antecedents continually for a diviſor, and the conſequents continually for a dividend, and the quot will be the anſwer or antecedent required.

Examp. 1. If London remit 1000 l. Sterling to Spain, by way of Holland, at 35 s. Flemiſh *per* l. Sterling; thence to France, at 58 d. Flemiſh *per* crown; thence to Venice, at 100 crowns *per* 60 ducats; and thence to Spain, at 360 mervadies *per* ducat; how many piaſtres, of 272 mervadies, will the 1000 l. Sterling amount to in Spain?

Antecedents.		*Conſequents.*	*Abridged.*
1 l. Sterling	=	35 s. or 420 d. Fl.	1=210
58 d. Flemiſh	=	1 crown France	29= 1
100 crowns France	=	60 ducats Venice	1= 30
1 ducat Venice	=	360 mervadies Spain	1= 45
272 mervadies	=	1 piaſtre	17= 1
How many piaſtres	=	1000 l. Sterling	= 10

In order to abridge the terms, divide 58 and 420 by 2, and you have the new antecedent 29, and the new conſequent 210; reject two ciphers in 100 and 1000; divide 272 and 360 by 8, and you have 34 and 45; divide 34 and 60 by 2, and you have 17 and 30; and the whole will ſtand abridged as above.

Then, $29 \times 17 = 493$ diviſor; and $210 \times 30 \times 45 \times 10 = 2835000$ dividend; and, 493)2835000($5750\frac{1}{2}$ piaſtres. *Anſ.*

Or, the conſequents may be connected with the ſign of multiplication, and placed over a line by way of numerator; and the antecedents, connected in the ſame manner, may be placed under the line, by way of denominator; and then abridged, as follows:

$$\frac{420\times60\times360\times100}{58\times100\times272}=\frac{210\times60\times360\times10}{29\times1\times272}$$

$$=\frac{210\times60\times45\times10}{29\times34}=\frac{210\times30\times45\times10}{29\times17}$$

$$=\frac{2835000}{493},$$

And, 493)2835000($5750\frac{1}{2}$ piaſtres. *Anſ.*

The placing the terms by way of antecedent and conſequent, and working as the rules direct, ſave ſo many ſtatings of the rule of three, and greatly ſhortens the operation. The proportions at large for the above queſtion would ſtand as under.

L. St. d.Fl. L. St. d. Fl.
If 1 : 420 :: 1000 : 420000
d. Fl. Cr. d. Fl. Cr.
If 58 : 1 :: 420000 : $7241\frac{11}{29}$
Cr. Duc. Cr. Duc.
If 100 : 60 :: $7241\frac{11}{29}$: $4344\frac{24}{29}$
Duc. Mer. Duc. Mer.
If 1 : 360 :: $4344\frac{24}{29}$: $1564137\frac{27}{29}$
Mer. Piaſt. Mer. Piaſt.
If 272 : 1 :: $1564137\frac{27}{29}$: $5750\frac{250}{493}$

If we ſuppoſe the courſe of direct exchange to Spain to be $42\frac{1}{2}$ d. Sterling *per* piaſtre, the 1000 l. remitted would only amount to $5647\frac{1}{2}$ piaſtres; and, conſequently, 103 piaſtres are gained by the negociation; that is, about 2 *per cent.*

2. A banker in Amſterdam remits to London 400l. Flemiſh; firſt to France at 56d. Flemiſh *per* crown; from France to Venice, at 100 crowns *per* 60 ducats; from Venice to Hamburgh, at 100d. Flemiſh *per* ducat; from Hamburgh to Liſbon, at 50d. Flemiſh *per* cruſade of 400 rees; and, laſtly, from Liſbon to London at 64d. Sterling *per* millree: How much Sterling money will the remittance amount to? and how much will be gained or ſaved, ſuppoſing the direct exchange from Holland to London at 36s. 10d. Flem. *per* l. Sterling?

Antecedents. *Conſequents.*
56d. Flem. = 1 crown
100 crowns = 60 ducats.
1 ducat = 100 d. Flem.
50 d. Flem. = 400 rees.
1000 rees = 64d. Sterling.
How many d. Ster = 400l. or 96000d. Flemiſh?

This, in the fractional form, will ſtand as follows.

$$\frac{60\times100\times400\times64\times96000}{56\times100\times50\times1000}=\frac{368640}{7}\text{, and}$$

7)368640(52662$\frac{6}{7}$d. Ster. = 219l. 8s. 6$\frac{6}{7}$d. St. *Anſ.*

To find how much the exchange from Amſterdam directly to London, at 36s. 10d. Flemiſh *per* l. Sterling, will amount to, ſay,

s.	*d.*	*d. Fl.*	*L. St.*	*d. Fl.*	*L.*	*s.*	*d. St.*
36	10	If 442 :	1 ::	96000 :	217	3	10½
12					219	8	6¾
442			Gained or ſaved,		2	4	8¼

In the above example, the par of arbitration, or the arbitrated price, between London and Amſterdam, *viz.* the number of Flemiſh pence given for 1l. Sterling, may be found thus:

Make 64d. Sterling, the price of the millree, the firſt antecedent; then all the former conſequents will become antecedents, and all the antecedents will become conſequents. Place 240, the pence in 1l. Sterling, as the laſt conſequent, and then proceed as taught above, *viz.*

Antecedents. *Conſequents.*
64 d. Ster = 1000 rees.
400 rees = 50 d. Flem.
100 d. Flem. = 1 ducat.
60 ducats = 100 crowns.
1 crown = 56d. Flem.
How many d. Flem. = 240d. Ster.?

$$\frac{1000\times50\times100\times56\times240}{64\times400\times100\times60}=\frac{875}{2}\text{, and}$$

2)875)437½d. = 36s. 5½d. Flem. *per* l. Ster. *Anſ.*

Or the arbitrated price may be found from the anſwer to the queſtion, by ſaying

d. Ster. *d. Flem.* *d. St.*
If $\frac{368640}{7}$: 96000 :: 240
7

672000
240

2688
1344

d. *s. d. Flem.*
368640)161280000(437½ = 36 5½ as before.

The work may be proved by the arbitrated price thus: As 1l. Sterling to 36s. 5½d. Flemiſh, ſo 219l. 8s. 6$\frac{6}{7}$d. Sterling to 400l. Flemiſh.

The arbitrated price compared with the direct courſe ſhows whether the direct or circular remittance will be moſt advantageous, and how much. Thus the banker at Amſterdam will think it better exchange to receive 1l. Sterling for 36s 5½d. Flemiſh, than for 36s. 10d. Flemiſh.

Exchange ſignifies alſo a place in moſt conſiderable trading cities, wherein the merchants, negociants, agents, bankers, brokers, interpreters, and other perſons concerned in commerce, meet on certain days, and at certain times thereof, to confer and treat together of matters relating to exchanges, remittances, payments, adventures, aſſurances, freightments, and other mercantile negociations, both by ſea and land.

EXCHEQUER, in the Britiſh juriſprudence, an ancient court of record, in which all cauſes concerning the revenues and rights of the crown are heard and determined, and where the crown revenues are received.

It took this name from the cloth that covered the table of the court, which was party-coloured, or chequered.

This court is ſaid to have been erected by William the conqueror, its model being taken from a like court eſtabliſhed in Normandy long before that time. Anciently its authority was ſo great, that it was held in the king's palace, and the acts thereof were not to be examined or controuled in any other of the king's courts; but, at preſent, it is the laſt of the four courts at Weſtminſter.

In the exchequer, ſome reckon ſeven courts, viz. thoſe of pleas, accounts, receipts, exchequer-chamber (which is an aſſembly of all the judges on difficult matters in law), errors in the exchequer, errors in the king's bench, and, laſtly, the court of equity in the exchequer.

But the exchequer, for the diſpatch of buſineſs, is generally divided into two parts; one of which is chiefly converſant in the judicial hearing and deciding of all cauſes relating to the king's coffers, formerly termed the *exchequer of accounts:* the other is called the *receipt of the exchequer*, as being principally employed in receiving and paying of money.

Officers of the receipt may take one penny in the pound, as their fee for ſums iſſued out; and they are obliged, without delay, to receive the money brought thither; and the money received is to be put into cheſts under three different locks and keys, kept by three ſeveral officers. All ſheriffs, bailiffs, &c. are to account in the exchequer; and in the lower part, termed the receipt, the debtors of the king, and perſons in debt to them, the king's tenants, and the officers and miniſters of the court, are privileged to ſue one another, or any ſtranger, and to be ſued in the like actions as are brought in the courts of king's bench and common-pleas.

The judicial part of the exchequer, is a court both of law and equity. The court of law is held in the office of pleas, according to the courſe of common law, before the barons: in this court, the plaintiff ought to be a debtor or accountant to the king; and the leading proceſs is either a writ of ſubpœna, or quo minus, which laſt goes into Wales, where no proceſs out

Exchequer, Exciſe.

out of ourts of law ought to run, except a capias utlagatum.

The court of equity is held in the exchequer chamber before the treaſurer, chancellor, and barons; but, generally, before the barons only; the lord chief baron being the chief judge to hear and determine all cauſes. The proceedings in this part of the exchequer are by Engliſh bill and anſwer, according to the practice of the court of chancery; with this difference, that the plaintiff here muſt ſet forth, that he is a debter to the king, whether he be ſo or not. It is in this court of equity that the clergy exhibit bills for the recovery of their tythes, &c. Here too the attorney-general exhibits bills for any matters concerning the crown; and a bill may be exhibited againſt the king's attorney by any perſon aggrieved in any cauſe proſecuted againſt him on behalf of the king, to be relieved therein: in which caſe, the plaintiff is to attend on the attorney-general, with a copy of the bill, and procure him to give in an anſwer thereto; in the making of which he may call in any perſon intereſted in the cauſe, or any officer, or others, to inſtruct him, that the king be not prejudiced thereby, and his anſwer is to be put in without oath.

But, beſides the buſineſs relating to debtors, farmers, receivers, accountants, &c, all penal puniſhments, intruſion, and forfeitures upon popular actions, are matters likewiſe cognizable by this court; where there alſo ſits a puiſne-baron, who adminiſters the oaths to high ſheriffs, bailiffs, auditors, receivers, collectors, comptrollers, ſurveyors, and ſearchers of all the cuſtoms, &c,

The exchequer in Scotland has the ſame privileges and juriſdiction as that of England; and all matters competent to the one, are likewiſe competent to the other.

Black Book of the EXCHEQUER, a book containing a deſcription of the court of England in 1175, and its officers, with their ranks, wages, privileges, perquiſites, &c. alſo the revenues of the crown, both in money and cattle.

EXCHEQUER-*Bills*. By ſtatute 5 Ann c. 13. the lord-treaſurers may cauſe exchequer bills to be made of any ſums not exceeding 1,500,000 *l.* for the uſe of the war; and the duties upon houſes were made chargeable with 4 l. 10 s. *per cent. per annum* to the bank for circulating them. The bank not paying the bills, actions to be brought againſt the company, and the money and damages recovered: and if any exchequer-bills be loſt, upon affidavit of it before a baron of the exchequer, and certificate from ſuch baron, and ſecurity to pay the ſame if found, duplicates are to be made out: alſo when bills are defaced, new ones ſhall be delivered. The king, or his officers in the exchequer, by former ſtatutes, might borrow money upon the credit of bills, payable on demand, with intereſt after the rate of 3 d. *per diem* for every 100 l. bill. And by 8 & 9 W. 3. *c.* 20. an intereſt of 5 d. a-day was allowed for every 100 l. But 12 W. 3. *c.* 1. lowered the intereſt on theſe bills to 4d. a-day *per cent.* And by 12 Ann. *c.* 11. it is ſunk to 2 d. a-day.—Forging exchequer bills, or the indorſements thereof, is felony.

Exciſe.

EXCISE, (from the Belgic *accüſe*, tributum, "tribute," an inland duty or impoſition, paid ſometimes upon the conſumption of the commodity, or frequently upon the wholeſale, which is the laſt ſtage before the conſumption. This is doubtleſs, impartially ſpeaking, the moſt œconomical way of taxing the ſubject; the charges of levying, collecting, and managing the exciſe-duties, being conſiderably leſs in proportion, than in other branches of the revenue. It alſo renders the commodity cheaper to the conſumer, than charging it with cuſtoms to the ſame amount would do; for the reaſon juſt now given, becauſe generally paid in a much later ſtage of it. But, at the ſame time, the rigour and arbitrary proceedings of exciſe-laws ſeem hardly compatible with the temper of a free nation. For the frauds that might be committed in this branch of the revenue, unleſs a ſtrict watch is kept, make it neceſſary, wherever it is eſtabliſhed, to give the officers a power of entering and ſearching the houſes of ſuch as deal in exciſeable commodities, at any hour of the day, and, in many caſes, of the night likewiſe. And the proceedings, in caſe of tranſgreſſions, are ſo ſummary and ſudden, that a man may be convicted in two days time in the penalty of many thouſand pounds, by two commiſſioners or juſtices of the peace; to the total excluſion of the trial by jury, and diſregard of the common law. For which reaſon, tho' lord Clarendon tells us, that to his knowledge the earl of Bedford (who was made lord treaſurer by king Charles I. to oblige his parliament) intended to have ſet up the exciſe in England, yet it never made a part of that unfortunate prince's revenue; being firſt introduced, on the model of the Dutch prototype, by the parliament itſelf after its rupture with the crown. Yet ſuch was the opinion of its general unpopularity, that when in 1642 "aſperſions were caſt by malignant perſons upon the houſe of commons, that they intended to introduce exciſes, the houſe for its vindication therein did declare, that theſe rumours were falſe and ſcandalous, and that their authors ſhould be apprehended and brought to condign puniſhment." It original eſtabliſhment was in 1643, and its progreſs was gradual; being at firſt laid upon thoſe perſons and commodities where it was ſuppoſed the hardſhip would be leaſt perceivable, viz. the makers and venders of beer, ale, cyder, and perry; and the royaliſts at Oxford ſoon followed the example of their brethren at Weſtminſter, by impoſing a ſimilar duty: both ſides proteſting, that it ſhould be continued no longer than to the end of the war, and then be utterly aboliſhed. But the parliament at Weſtminſter ſoon after impoſed it on fleſh, wine, tobacco, ſugar, and ſuch a multitude of other commodities, that it might be fairly denominated *general*: in purſuance of the plain laid down by Mr Pymme (who ſeems to have been the father of the exciſe) in his letter to Sir John Hotham, ſignifying, "that they had proceeded in the exciſe to many particulars, and intended to go on farther; but that it would be neceſſary to uſe the people to it by little and little." And afterwards, when the nation had been accuſtomed to it for a ſeries of years, the ſucceeding champions of liberty boldly and openly declared "the impoſt of exciſe to be the moſt eaſy and indifferent levy that could be laid upon the people;" and accordingly continued it during the whole uſurpation. Upon king Charles's return, it having then been long eſtabliſhed and its produce well known, ſome part of it was given to the crown

Blackſt. Comment.

crown, in 12 Car. II. by way of purchaſe for the feodal tenures and other oppreſſive parts of the hereditary revenue. But, from its firſt original to the preſent time, its very name has been odious to the people. It has, nevertheleſs, been impoſed on abundance of other commodities in the reigns of king William III. and every ſucceeding prince, to ſupport the enormous expenſes occaſioned by our wars on the continent. Thus brandies and other ſpirits are now exciſed at the diſtillery; printed ſilks and linens, at the printer's; ſtarch and hair powder, at the maker's; gold and ſilver wire, at the wiredrawer's; all plate whatſoever, firſt in the hands of the vendor, who pays yearly for a licenſe to ſell it, and afterwards in the hands of the occupier, who alſo pays an annual duty for having it in his cuſtody; and coaches and other wheel-carriages, for which the occupier is exciſed; tho' not with the ſame circumſtances of arbitrary ſtrictneſs with regard to plate and coaches, as in the other inſtances. To theſe we may add coffee and tea, chocolate and cocoa paſte, for which the duty is paid by the retailer; all artificial wines, commonly called *ſweets*; paper and paſteboard, firſt when made, and again if ſtained or printed; malt, as beforementioned; vinegars; and the manufacture of glaſs; for all which the duty is paid by the manufacturer; hops, for which the perſon that gathers them is anſwerable; candles and ſoap, which are paid for at the maker's; malt liquors brewed for ſale, which are exciſed at the brewery; cyder and perry, at the vender's; and leather and ſkins, at the tanner's. A liſt, which no friend to his country would wiſh to ſee farther encreaſed.

The exciſe was formerly farmed out; but is now managed for the king by commiſſioners in both kingdoms, who receive the whole product of the exciſe, and pay it into the exchequer. Theſe commiſſioners are nine in number in England, and four in Scotland. The former have a ſalary of 1000 l. a-year, the latter 500 l. They are obliged by oath to take no fee or reward but from the king himſelf; and from them there lies an appeal to five other commiſſioners called *commiſſioners of appeals*.

If any brewers do not make true entries of their liquors brewed once a-week at the exciſe office, they forfeit 10 l. but this is ſubject to mitigation, ſo as not to be leſs than double the duty; and the retailers of beer and ale and ſtrong waters, neglecting to make their entries once a-month of what liquors they retail, are liable to 40 s. penalty. In caſe any brewer erects or alters any back, copper, cooler, &c. or keeps a private ſtore-houſe, or if any malſter keeps any private veſſel for ſteeping barley, without giving proper notice to the officers of exciſe, ſuch brewer or malſter forfeits 50 l. and where they bribe a gauger, it is 10 l. The officers of exciſe may go on board ſhips, and ſearch for any exciſeable liquors, as officers of the cuſtoms do, and ſeize commodities forfeited, &c. and complaints made at the chief office of exciſe are to be heard by three or more commiſſioners; but two juſtices of the peace have the power to determine in ſeizures out of the limits of the exciſe-office in London. See further, *Table* to the quarto edition of the *Statutes at Large*; alſo an account of the method of charging the duties of exciſe, &c. at the end of *Gilb. Exch.* edit. 1758, p. 293.

EXCLAMATION. See ORATORY, n° 85.

EXCLUSION, or *Bill of* EXCLUSION, a bill propoſed about the cloſe of the reign of king Charles II. for excluding the duke of York, the king's brother, from the throne, on account of his being a Papiſt.

EXCLUSIVE, is ſometimes uſed adjectively, thus; *A patent carries with it an excluſive privilege*: and ſometimes adverbially; as, *he ſent him all the numbers from* n° 145 *to* n° 247 *excluſive*; that is, all between theſe two numbers, which themſelves were excepted.

EXCOMMUNICATION, an eccleſiaſtical penalty or cenſure, whereby ſuch perſons as are guilty of any notorious crime or offence, are ſeparated from the communion of the church, and deprived of all ſpiritual advantages.

Excommunication among the Jews, according to Elias, a German rabbin, was diſtinguiſhed into three kinds: 1. Niddui, which was a ſeparation of but a few days; 2. Cherem, a ſeparation attended with execration and malediction; and, 3. Shammatha, which was the laſt and greater excommunication. But Selden ſays, that niddui and ſhammatha are the ſame thing; and therefore that there were but two kinds of excommunication among the Jews, viz. the greater and the leſſer. They made alſo another diſtinction in excommunication, into total or univerſal, by which a man was excommunicated with regard to all men; and partial, by which a man was excommunicated in one city, and with regard to certain perſons, and not others.

It is obſervable, that not only the judges had the power of excommunicating, but that each particular perſon in converſation might excommunicate another, and himſelf likewiſe; and this excommunication, if well grounded, was of force: nay, if a man dreamed that he was excommunicated by himſelf or by another, he was conſidered as an excommunicated perſon, becauſe this dream was ſuppoſed to be ſent from God.

As to the effects of the Jewiſh excommunication, the leſſer excluded the excommunicated perſon from the ſociety of men; that is, he was not to come nearer them than four cubits, neither he, his wife, children, or domeſtics, according to Buxtorf. The greater abſolutely ſequeſtered the perſon from the converſation of others; and ſometimes he was ſhut up in a ſmall chamber or priſon, where he lived alone. Baronius and Beza pretend, that the greater excommunication excluded men from the uſe of ſacred things. Selden, on the contrary, affirms that they were allowed to be preſent in the temple, and partake of the public worſhip. Buxtorf, who is of the ſame opinion, adds, that whereas others came into the temple at the right hand, and went out at the left, the excommunicated were obliged both to go in and out at the left.

Excommunication, among the modern Jews, is attended with the moſt terrible conſequences. The excommunicated perſon is refuſed all human aſſiſtance: if there be a corpſe in his houſe, or a child to be circumciſed, none muſt help him. He is curſed by the book of the law, by the curſe of Joſhua againſt Jericho, by that of Eliſha againſt the children, by heaven and earth, and God is beſought that a whirlwind may daſh him to pieces. He is pelted with ſtones if he appear in the ſtreets: and if he obtains abſolution, it is upon the moſt mortifying conditions; for he is publicly tied to a poſt and whipped, after which he lays himſelf down at the door of the ſynagogue, and all thoſe who go out paſs over him. This was the very caſe of the famous Jew Acoſta.

In the ancient Chriſtian church, the power of excommunication, as well as other acts of eccleſiaſtical diſcipline, was lodged in the hands of the clergy, who diſtinguiſhed it into the *greater* and *leſſer*. The leſſer excommunication, ſimply called *aphoriſmos*, ſeparation or ſuſpenſion, conſiſted in excluding men from the participation of the euchariſt, and the prayers of the faithful. But they were not expelled the church; for they had the privilege of being preſent at the reading of the Scriptures, the ſermons, and the prayers of the catechumens and penitents. This excommunication was inflicted for leſſer crimes; ſuch as neglecting to attend the ſervice of the church, miſbehaviour in it, and the like.

The greater excommunication, called *panteles aphoriſmos*, total ſeparation and anathema, conſiſted in an abſolute and entire excluſion from the church and the participation of all its rites. When any perſon was thus excommunicated, notice was given of it by circular letters to the moſt eminent churches all over the world, that they might all confirm this act of diſcipline, by refuſing to admit the delinquent to their communion. The conſequences of this latter excommunication were very terrible. The excommunicated perſon was avoided in civil commerce and outward converſation. No one was to receive him into his houſe, nor eat at the ſame table with him; and when dead, he was denied the ſolemn rites of burial. It has been a queſtion, whether the ancient church uſed to add execration to her cenſures. Grotius thinks this was done, though very ſeldom, as in the caſe of Julian the apoſtate, for whoſe deſtruction, he ſays, the ancient Chriſtians abſolutely prayed to God. St Chryſoſtom was utterly againſt this practice, affirming that we ought not to pray againſt the ſinner, but againſt his opinions or actions.

The Romiſh pontifical takes notice of three kinds of excommunication. 1. The minor, incurred by thoſe who have any correſpondence with an excommunicated perſon. 2. The major, which falls upon thoſe who diſobey the commands of the holy ſee, or refuſe to ſubmit to certain points of diſcipline; in conſequence of which they are excluded from the church militant and triumphant, and delivered over to the devil and his angels. 3. Anathema, which is properly that pronounced by the pope againſt heretical princes and countries. In former ages, theſe papal fulminations were moſt terrible things; but at preſent, they are formidable to none but a few petty ſtates of Italy.

Excommunication, in the Greek church, cuts off the offender from all communion with the 318 fathers of the firſt council of Nice, and with the ſaints; conſigns him over to the devil, and the traitor Judas; and condemns his body to remain after death as hard as a flint or piece of ſteel, unleſs he humbles himſelf and makes atonement for his ſins by a ſincere repentance. The form abounds with dreadful imprecations; and the Greeks aſſert, that if a perſon dies excommunicated, the devil enters into the lifeleſs corpſe; and therefore, in order to prevent it, the relations of the deceaſed cut his body in pieces, and boil them in wine. It is a cuſtom for the patriarch of Jeruſalem annually to excommunicate the pope and the church of Rome; on which occaſion, together with a great deal of idle ceremony, he drives a nail into the ground with a hammer, as a mark of malediction.

The form of excommunication in the church of England anciently ran thus: "By the authority of God the Father Almighty, the Son and Holy Ghoſt, and of Mary the bleſſed mother of God, we excommunicate, anathematize, and ſequeſter from the pale of holy mother church, &c." The cauſes of excommunication in England are, contempt of the biſhop's court, hereſy, neglect of public worſhip and the ſacraments, incontinency, adultery, ſimony, &c. It is deſcribed to be twofold. The leſs is an eccleſiaſtical cenſure, excluding the party from the participation of the ſacraments: the greater proceeds farther, and excludes him not only from theſe, but from the company of all Chriſtians. But, if the judge of any ſpiritual court excommunicates a man for a cauſe of which he hath not the legal cognizance, the party may have an action againſt him at common law, and he is alſo liable to be indicted at the ſuit of the king.

Heavy as the penalty of excommunication is, conſidered in a ſerious light, there are, notwithſtanding, many obſtinate or profligate men, who would deſpiſe the *brutum fulmen* of mere eccleſiaſtical cenſures, eſpecially when pronounced by a petty ſurrogate in the country, for railing or contumelious words, for nonpayment of fees or coſts, or other trivial cauſe. The common law, therefore, compaſſionately ſteps in to their aid, and kindly lends a ſupporting hand to an otherwiſe tottering authority. Imitating herein the policy of the ancient Britons, among whom, according to Ceſar, whoever were interdicted by the druids from their ſacrifices, "In numero impiorum ac ſceleratorum habentur: ab iis omnes decedunt, aditum eorum ſermonemque defugiunt, ne quid ex contagione incommodi accipiant: neque iis petentibus jus redditur, neque honos ullus communicatur." And ſo with us, by the common law, an excommunicated perſon is diſabled to do any act that is required to be done by one that is *probus et legalis homo*. He cannot ſerve upon juries; cannot be a witneſs in any court; and, which is the worſt of all, cannot bring an action, either real or perſonal, to recover lands or money due to him. Nor is this the whole: for if, within 40 days after the ſentence has been publiſhed in the church, the offender does not ſubmit and abide by the ſentence of the ſpiritual court, the biſhop may certify ſuch contempt to the king in chancery. Upon which there iſſues out a writ to the ſheriff of the county, called from the biſhop's certificate a *ſignificavit*; or from its effect, a writ *de excommunicato capiendo*: and the ſheriff ſhall thereupon take the offender and impriſon him in the county jail, till he is reconciled to the church, and ſuch reconciliation certified by the biſhop; upon which another writ *de excommunicato deliberando*, iſſues out of chancery to deliver and releaſe him.

EXCORIATION, in medicine and ſurgery, the galling, or rubbing off of the cuticle, eſpecially of the parts between the thighs and about the anus. In adults, it is occaſioned by riding, much walking, or other vehement exerciſe, and may be cured by vulnerary applications. In children there is often an excoriation, not

Excrement.

not only of the parts near the pudenda, chiefly of the groin and ſcrotum, but likewiſe in the wrinkles of the neck, under the arms, and in other places; proceeding from the acrimony of urine and ſweat; and occaſioning itching, pains, crying, watching, reſtleſsneſs, &c. To remedy this, the parts affected may be often waſhed with warm water, and ſprinkled with drying powders, as chalk, hartſhorn, but eſpecially tutty, lapis calaminaris, and ceruſs, which may be tied looſely in a rag, and the powder ſhook out on the diſordered places. If the parts tend to a real ulceration, it will be proper to add a little ſugar of lead to the powder, or to anoint the place with *unguent. alb. camphorat.*

EXCREMENT, whatever is diſcharged out of the body of animals after digeſtion; or the fibrous part of the aliment, mixed with the bile, ſaliva, and other fluids. Urine and the feces are the groſs excrements that are diſcharged out of the bladder or belly. Other excrements are the various humours that are ſecreted from the blood through the different ſtrainers in the body, and which ſerve for ſeveral uſes; ſuch as the ſaliva, ſweat, bile, the pancreatic juice, lymph, the ſemen, nails, the hair, the horns and hoofs of animals.

Alchemiſts who have ſought every where for their *great work*, as they called it, have particularly operated much on the excrements of men and other animals; but philoſophical chemiſtry has acquired no knowledge from all theſe alchemical labours, from the obſcurity with which their authors have deſcribed them. The philoſophic chemiſts have not much examined animal excrements. Of theſe, Homberg is the only one who has particularly analyſed and examined human ordure; and this was done to ſatisfy an alchemical project of one of his friends, who pretended that from this matter a white oil could be obtained, without ſmell, and capable of fixing mercury into ſilver. The oil was found by Homberg, but mercury was not fixed by it.

The labours of this able chemiſt were not however uſeleſs, like thoſe of the alchemiſts; becauſe he has clearly related the experiments he made on this matter, in the memoirs of the academy of ſciences. Theſe experiments are curious, and teach ſeveral eſſential things concerning the nature of excrements. The reſult of theſe experiments is as follows. Freſh human feces, being diſtilled to dryneſs in a water bath, furniſh a clear, watery, inſipid liquor, of a diſagreeable ſmell, but which contains no volatile alkali; which is a proof that this matter, although nearly in a putrefactive ſtate, is not however putrefied; for all ſubſtances really putrid furniſh with this degree of heat a manifeſt volatile alkali *.—The dry reſiduum of the foregoing experiment, being diſtilled in a retort with a graduated fire, furniſhes a volatile alkaline ſpirit and ſalt, a fetid oil, and leaves a reſiduous coal. Theſe are the ſame ſubſtances which are obtained from all animal matters.

e Putre-
ion.

Human feces, diluted and lixiviated in water, furniſh by filtration and evaporation of the water an oily ſalt of a nitrous nature, which deflagrates like nitre upon ardent coals, and which inflames in cloſe veſſels when heated to a certain degree.—This ſame matter yielded to Homberg, who treated it by a complete fermentation or putrefaction, excited by a digeſtion during 40 days in a gentle water-bath heat, and who afterwards diſtilled it, an oil without colour, and without bad ſmell, and ſuch as he endeavoured to find; but which did not, as we ſaid before, fix mercury into ſilver.

EXCRESCENCE, in ſurgery, denotes every preternatural tumour which ariſes upon the ſkin, either in the form of a wart or tubercle. If they are born with a perſon, as they frequently are, they are called *nævi materni*, or marks from the mother; but if the tumour is large, ſo as to depend from the ſkin, like a fleſhy maſs, it is then called a *ſarcoma*. See SURGERY.

EXCRETION, or SECRETION, in medicine, a ſeparation of ſome fluid, mixed with the blood, by means of the glands. Excretions, by which we mean thoſe that evacuate ſuperfluous and heterogeneous humours, purify the maſs of blood: the humours which are generated in the blood are excreted by the glands, and are replaced by a ſufficient quantity of aliment.

EXCRETORY, in anatomy, a term applied to certain little ducts or veſſels, deſtined for the reception of a fluid, ſecreted in certain glandules, and other viſcera, for the excretion of it in the appropriated places.

LETTERS *of* EXCULPATION, in Scots law, a writ or ſummons iſſued by authority of the court of juſticiary, at the inſtance of a pannel, for citing witneſſes to prove his defences, or his objections to any of the jury or witneſſes cited againſt him.

EXCURSION, in aſtronomy, is uſed in a ſynonimous ſenſe with ELONGATION.

EXECRATION, in antiquity, a kind of puniſhment, conſiſting of direful curſes and marks of infamy: ſuch was that uſed againſt Philip king of Macedon, by the Athenians. A general aſſembly of the people being called, they made a decree, that all the ſtatues and images of that king, and of all his anceſtors, ſhould be demoliſhed, and their very names razed; that all the feſtivals, ſacred rites, prieſts, and whatever elſe had been inſtituted in honour of him, ſhould be prophaned; that the very places where there had been any monument or inſcription to his honour, ſhould be deteſtable; that nothing ſhould be ſet up, or dedicated in them, which could be done in clean places: and, laſtly, that the prieſts, as often as they prayed for the Athenian people, allies, armies, and fleets, ſhould as many times deteſt and execrate Philip, his children, kingdom, land and ſea forces, and the whole race and name of the Macedonians.

EXECUTION, in a general ſenſe, the act of accompliſhing, finiſhing, or atchieving any thing.

EXECUTION, in law, the completing or finiſhing ſome act, as of judgment, deed, &c. and it uſually ſignifies the obtaining poſſeſſion of any thing recovered by judgment of law.

Sir Edward Coke obſerves, that there are two ſorts of executions: the one final; and the other a quouſque, that tends to an end. An execution final, is that which makes money of the defendant's goods; or extends to his lands, and delivers them to the plaintiff, who accepts the ſame in ſatisfaction; and this is the end of the ſuit, and the whole that the king's writ requires to be done. The writ of execution with a quouſque, tho' it tends to an end, yet is not final, as in the caſe of a *capias ad ſatisfac.* where the defendant's body is to be taken, in order that the plaintiff may be ſatisfied for his debt. See CAPIAS.

Executions are either in perſonal, real, or mixed actions. In a perſonal action, the execution may be made three ways, *viz.* by the writ of *capias ad ſatisfaciendum*, againſt the body of the defendant; *fieri facias*, againſt his goods; or *elegit*, againſt his lands. See FIERI FACIAS, and ELEGIT.

In a real and mixed action, the execution is by writ of *habere facias ſeiſinam*, and *habere poſſeſſionem*[*]. Writs of execution bind the property of goods only from the time of delivery of the writ to the ſheriff; but the land is bound from the day of the judgment obtained: and here the ſale of any goods for valuable conſideration, after a judgment, and before the execution awarded, will be good. It is otherwiſe as to lands of which execution may be made, even on a purchaſe after the judgment, though the defendant ſell ſuch land before execution. Likewiſe, ſheriffs may deliver in execution all the lands whereof others ſhall be ſeiſed in truſt for him, againſt whom execution is had on a judgment, &c.

When any judgment is ſigned, the execution may be taken out immediately thereon; but if it be not iſſued within a year and a day after, where there is no fault in the defendant, as in the caſe of an injunction, writ of error, &c. there muſt be a *ſcire facias*, to revive the judgment; though, if the plaintiff ſues out any writ of execution within the year, he may continue it after the year is expired. After judgment againſt the defendant, in an action wherein ſpecial bail is given, the plaintiff is at liberty to have execution againſt ſuch defendant, or againſt his bail: but this is underſtood where the defendant does not render himſelf, according to law, in ſafeguard of the bail: and execution may not regularly be ſued forth againſt a bail, till a default is returned againſt the principal: alſo if the plaintiff takes the bail, he ſhall never take the principal. It is held that an execution may be executed after the death of the defendant: for his executor, being privy thereto, is liable, as well as the teſtator. The execution is an entire thing, ſo that he who begins muſt end it: therefore, a new ſheriff may diſtrain an old one, to ſell the goods ſeiſed on a diſtringas, and to bring the money into court.

EXECUTION, in criminal caſes, the completion of human puniſhment. This follows judgment[‡]; and muſt in all caſes, capital as well as otherwiſe, be performed by the legal officer, the ſheriff or his deputy; whoſe warrant for ſo doing was anciently by precept under the hand and ſeal of the judge, as it is ſtill practiſed in the court of the lord high ſteward, upon the execution of a peer: though, in the court of the peers in parliament, it is done by writ from the king. Afterwards it was eſtabliſhed, that, in caſe of life, the judge may command execution to be done without any writ. And now the uſage is, for the judge to ſign the calendar or liſt of all the priſoners names, with their ſeparate judgments in the margin, which is left with the ſheriff. As, for a capital felony, it is written oppoſite to the priſoner's name, "let him be hanged by the neck;" formerly, in the days of Latin and abbreviation, "*ſuſ. per coll.*" for "*ſuſpendatur per collum.*" And this is the only warrant that the ſheriff has, for ſo material an act as taking away the life of another. It may certainly afford matter of ſpeculation, that in civil cauſes there ſhould be ſuch a variety of writs of execution to recover a trifling debt, iſſued in the king's name, and under the ſeal of the court, without which the ſheriff cannot legally ſtir one ſtep; and yet that the execution of a man, the moſt important and terrible taſk of any, ſhould depend upon a marginal note.

Blackſt. Comment.

The ſheriff, upon receipt of his warrant, is to do execution within a convenient time; which in the country is alſo left at large. In London, indeed, a more ſolemn and becoming exactneſs is uſed, both as to the warrant of execution, and the time of executing thereof: for the recorder, after reporting to the king in perſon the caſe of the ſeveral priſoners, and receiving his royal pleaſure, that the law muſt take its courſe, iſſues his warrant to the ſheriffs, directing them to do execution on the day and at the place aſſigned. And in the court of king's bench, if the priſoner be tried at the bar, or brought there by *habeas corpus*, a rule is made for his execution; either ſpecifying the time and place, or leaving it to the diſcretion of the ſheriff. And, throughout the kingdom, by ſtatute 25 Geo. II. c. 37. it is enacted that, in caſe of murder, the judge ſhall in his ſentence direct execution to be performed on the next day but one after ſentence paſſed. But, otherwiſe, the time and place of execution are by law no part of the judgment. It has been well obſerved, that it is of great importance, that the puniſhment ſhould follow the crime as early as poſſible; that the proſpect of gratification or advantage, which tempts a man to commit the crime, ſhould inſtantly awake the attendant idea of puniſhment. Delay of execution ſerves only to ſeparate theſe ideas: and then the execution itſelf affects the minds of the ſpectators rather as a terrible ſight, than as the neceſſary conſequence of tranſgreſſion.

The ſheriff cannot alter the manner of the execution, by ſubſtituting one death for another, without being guilty of felony himſelf. It is held alſo by Sir Edward Coke and Sir Matthew Hale, that even the king cannot change the puniſhment of the law, by altering the hanging or burning into beheading; though, when beheading is part of the ſentence, the king may remit the reſt. And, notwithſtanding ſome examples to the contrary, Sir Edward Coke ſtoutly maintains, that *judicandum eſt legibus, non exemplis*. But others have thought, and more juſtly, that this prerogative, being founded in mercy, and immemorially exerciſed by the crown, is part of the common law. For hitherto, in every inſtance, all theſe exchanges have been for more merciful kinds of death; and how far this may alſo fall within the king's power of granting conditional pardons, (*viz.* by remitting a ſevere kind of death, on condition that the criminal ſubmits to a milder) is a matter that may bear conſideration. It is obſervable, that when Lord Stafford was executed for the popiſh plot in the reign of king Charles II. the then ſheriffs of London, having received the king's writ for beheading him, petitioned the houſe of lords, for a command or order from their lordſhips, how the ſaid judgment ſhould be executed: for, he being proſecuted by impeachment, they entertained a notion (which is ſaid to have been countenanced by Lord Ruſſel), that the king could not pardon any part of the ſentence. The lords reſolved, that the ſcruples of the ſheriffs were unneceſſary; and declared, that the king's writ ought to be obeyed. Diſappointed of raiſing a flame in that aſſembly, they immediately ly ſignified to the houſe of commons by one of the members, that they were not ſatisfied as to the power of the ſaid writ. That houſe took two days to conſider of it; and then ſullenly reſolved, that the houſe was *content* that the ſheriff do execute Lord Stafford by ſevering his head from his body. It is farther related, that when afterwards the ſame Lord Ruſſel was condemned for high treaſon upon indictment, the king, while he remitted the ignominious part of the ſentence, obſerved, " that his Lordſhip would now find he was poſſeſſed of that prerogative, which in the caſe of Lord Stafford he had denied him." One can hardly determine (at this diſtance from thoſe turbulent times), which moſt to diſapprove of, the indecent and ſanguinary zeal of the ſubject, or the cool and cruel ſarcaſm of the ſovereign.

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[*] See *Habere.*

[‡] See *Judgment.*

To conclude: it is clear, that if, upon judgment to be hanged by the neck till he is dead, the criminal be not thoroughly killed, but revives, the ſheriff muſt hang him again. For the former hanging was no execution of the ſentence; and, if a falſe tenderneſs were to be indulged in ſuch caſes, a multitude of colluſions might enſue. Nay, even while abjurations were in force, ſuch a criminal, ſo reviving, was not allowed to take ſanctuary and abjure the realm; but his fleeing to ſanctuary was held an eſcape in the officer.

Execution, in the law of Scotland. See Law, Part III. nº clxxxv. 52. clxxxvi. 15.

EXECUTIVE power. The ſupreme executive power of theſe kingdoms is veſted by our laws in a ſingle perſon, the king or queen for the time being. See the article King.

The executive power, in this ſtate, hath a right to a negative in parliament, *i. e.* to refuſe aſſent to any acts offered; otherwiſe the other two branches of legiſlative power would, or might, become deſpotic.

EXECUTOR, in Scots law, ſignifies either the perſon intitled to ſucceed to the moveable eſtate of one deceaſed, or who by law or ſpecial appointment is intruſted with the adminiſtration of it.

EXECUTORY, in law, is where an eſtate in fee, that is made by deed or fine, is to be executed afterwards by entry, livery, or writ. Leaſes for years, annuities, conditions, &c. are termed inheritances executory.

EXECUTRY, in Scots law, is the moveable eſtate falling to the executor. Under executry, or moveables, is comprehended every thing that moves itſelf, or can be moved; ſuch as corns, cattle, furniture, ready money, &c.

EXEDRÆ, in antiquity, a general name for ſuch buildings as were diſtinct from the main body of the churches, and yet within the limits of the church taken in its largeſt ſenſe. Among the exedræ the chief was the Baptistery.

EXEGESIS, a diſcourſe by way of explanation or comment upon any ſubject. In the Scotch univerſities, there is an exerciſe among the ſtudents in divinity, called an *exegeſis*, in which a queſtion is ſtated by the reſpondent, who is then oppoſed by two or three other ſtudents in their turns; during which time the profeſſor moderates, and ſolves the difficulties which the reſpondent cannot overcome.

EXEMPLAR, denotes much the ſame with model. See Model.

EXEMPLIFICATION *of* Letters-patent, a tranſcript or duplicate of them, made from the inrollment thereof, and ſealed with the great ſeal.

EXEMPTION, in law, a privilege to be free from ſome ſervice or appearance: thus, barons and peers of the realm are, on account of their dignity, exempted from being ſworn upon inqueſts; and knights, clergymen, and others, from appearing at the ſheriff's turn. Perſons of 70 years of age, apothecaries, &c. are alſo by law exempted from ſerving on juries; and juſtices of the peace, attorneys, &c. from pariſh-offices.

EXERCISE, among phyſicians, ſuch an agitation of the body as produces ſalutary effects in the animal œconomy.

Exerciſe may be ſaid to be either active or paſſive. The active is walking, hunting, dancing, playing at bowls, and the like; as alſo ſpeaking, and other labour of the body and mind. The paſſive is riding in a coach, on horſeback, or in any other manner. Exerciſe may be continued to a beginning of wearineſs, and ought to be uſed before dinner in a pure light air; for which reaſon, journeys, and going into the country, contribute greatly to preſerve and re-eſtabliſh health.

Exerciſe increaſes the circulation of the blood, attenuates and divides the fluids, and promotes a regular perſpiration, as well as a due ſecretion of all the humours; for it accelerates the animal-ſpirits, and facilitates their diſtribution into all the fibres of the body, ſtrengthens the parts, creates an appetite, and helps digeſtion. Whence it ariſes, that thoſe who accuſtom themſelves to exerciſe are generally very robuſt, and ſeldom ſubject to diſeaſes.

Boerhaave recommends bodily exerciſe in diſeaſes of a weak and lax fibre. By riding on horſeback, ſays his commentator, the pendulous viſcera of the abdomen are ſhaken every moment, and gently rubbed as it were one againſt another, while in the mean time the pure air acts on the lungs with greater force. But it is to be obſerved, that a weak man ſhould not ride with a full ſtomach, but either before dinner, or after the digeſtion is near finiſhed; for when the ſtomach is diſtended, weak people do not bear theſe concuſſions of the horſe without difficulty; but when the primæ viæ are near empty, the remaining feces are diſcharged by this concuſſion. Sailing in a ſhip is alſo an exerciſe of great uſe to weak people. If the veſſel moves with an even motion, by increaſing perſpiration it uſually excites a wonderful alacrity, creates an appetite, and promotes digeſtion. Theſe exerciſes are more eſpecially ſerviceable to weak people; but, in order to ſtrengthen the body by muſcular motion, running, and bodily exerciſes, are to be uſed. In theſe we ſhould begin with the moſt gentle, ſuch as walking, and increaſe it by degrees till we come to running. Thoſe exerciſes of the body are more eſpecially ſerviceable which give delight to the mind at the ſame time, as tennis, fencing, &c.; for which reaſon, the wiſdom of antiquity appointed rewards for thoſe who excelled in theſe gymnaſtic exerciſes, that by this means the bodies of their youth might be hardened for warlike toils.

As nothing is more conducive to health than moderate exerciſe, ſo violent exerciſe diſſipates the ſpirits, weakens the body, deſtroys the elaſticity of the fibres, and exhauſts the fluid parts of the blood. No wonder, then, that acute and mortal fevers often ariſe from too violent exerciſe of the body; for the motion of the venous blood towards the heart being quickened by the contraction of the muſcles, and the veins being thus depleted, the arteries more eaſily propel their contained humours through the ſmalleſt extremities into the now leſs reſiſting veins; and therefore the velocity of the circulation will be increaſed through all the veſſels. But this cannot be performed without applying the humours oftener, or in a greater quantity, to the ſecretory organs in the ſame time, whence the more fluid parts of the blood will be diſſipated, and what remains will be inſpiſſated; and by the greater action of the veſſels upon their contained fluids, and of the reacting fluids upon the veſſels, the blood acquires an inflammatory denſity. Add to this, that by the violent attrition of the ſolids and fluids, together with the heat thence ariſing, all the humours will incline to a greater acrimony, and the ſalts and oils of the blood will become more acrid and volatile. Hence, ſays Boerhaave, thoſe fevers which ariſe from too much exerciſe or motion, are cured by reſt of body and mind, with ſuch aliments and medicines as moiſten, dilute, and ſoften or allay acrimony.

The exerciſe of a ſoldier in camp, conſidered as conducive to health, Dr Pringle diſtinguiſhes into three heads; the firſt relating to his duty, the ſecond to his living more commodiouſly, and the third to his diverſions. The firſt, conſiſting chiefly in the exerciſe of his arms, will be no leſs the means of preſerving health, than of making him expert in his duty: and frequent returns of this, early, and before the ſun grows hot, will be made more advantageous than repeating it ſeldom, and ſtaying out long at a time; for a camp affording little convenience for refreſhment, all unneceſſary fatigue is to be avoided. As to the ſecond article, cutting boughs for ſhading the tents, making trenches round them for carrying off the water, airing the ſtraw, cleaning their cloaths and accoutrements, and aſſiſting in the buſineſs of the meſs, ought to be no diſagreeable exerciſe to the men for ſome part of the day. Laſtly, as to diverſions, the men muſt be encouraged to them either by the example of their officers, or by ſmall premiums to thoſe who ſhall excel in any kind of ſports as ſhall be judged moſt conducive to health: but herein great caution is neceſſary, not to allow them to fatigue themſelves too much, eſpecially in hot weather, or ſickly times; but above all, that their cloaths be kept dry, wet cloaths being the moſt frequent cauſes of camp-diſeaſes.

Exercise, in military affairs, is the ranging a body of ſoldiers in form of battle, and making them perform the ſeveral motions and military evolutions with different management of their arms, in order to make them expert therein.

Exercise, in the royal navy, is the preparatory practice of managing the artillery and ſmall-arms, in order to make the ſhip's crew perfectly ſkilled therein, ſo as to direct its execution ſucceſsfully in the time of battle.

The exerciſe of the great guns has, till the late war, been very complicated, and abounding with ſuperfluities, in our navy, as well as all others. The following method was then ſucceſsfully introduced by an officer of diſtinguiſhed abilities.

1ſt, Silence.
2d, Caſt looſe your guns.
3d, Level your guns.
4th, Take out your tompions.
5th, Run out your guns.
6th, Prime.
7th, Point your guns.
8th, Fire.
9th, Spunge your guns.
10th, Load with cartridge.
11th, Shot your guns.
12th, Put in your tompions.
13th, Houſe your guns.
14th, Secure your guns.

Upon beat-to-arms (every body having immediately repaired to their quarters) the midſhipman commanding a number of guns, is to ſee that they are not without every neceſſary article, as (at every gun) a ſpunge, powder-horn, with its priming wires, and a ſufficient quantity of powder, crow, hand-ſpike, bed, quoin, train-tackle, &c. ſending without delay for a ſupply of any thing that may be amiſſing; and, for the greater certainty of not overlooking any deficiency, he is to give ſtrict orders to each captain under him, to make the like examination at his reſpective gun, and to take care that every requiſite is in a ſerviceable condition, which he is to report accordingly. And (beſides the other advantages of this regulation) for the ſtill more certain and ſpeedy account being taken upon theſe occaſions, the midſhipman is to give each man his charge at quarters (as expreſſed in the form of the monthly report), who is to ſearch for his particular implements, and, not finding them, is immediately to acquaint his captain, that, upon his report to the midſhipman, they may be replaced.

The man who takes care of the powder, is to place himſelf on the oppoſite ſide of the deck from that where we engage, except when fighting both ſides at once, when he is to be amid-ſhips. He is not to ſuffer any other man to take a cartridge from him, but he who is appointed to ſerve the gun with that article, either in time of a real engagement, or at exerciſe.

Lanthrons are not to be brought to quarters in the night, until the midſhipman gives his orders for ſo doing to the perſon he charges with that article. Every thing being in its place, and not the leaſt lumber in the way of the guns, the exerciſe begins with,

1. "Silence." At this word every one is to obſerve a ſilent attention to the officers.

2. "Caſt looſe your guns." The muzzle laſhing is to be taken off from the guns, and (being coiled up in a ſmall compaſs) is to be made faſt to the eye-bolt above the port. The laſhing-tackles at the ſame time to be caſt looſe, and the middle of the breeching ſeized to the thimble of the pommillion. The ſpunge to be taken down, and, with the crow, hand-ſpike, &c. laid upon the deck by the gun. N. B. When prepared for engaging an enemy, the ſeizing within the clinch of the breeching is to be cut, that the gun may come ſufficiently within-board for loading, and that the force of the recoil may be more ſpent before its acts upon the breeching.

3. "Level your guns." The breech of your metal is to be raiſed ſo as to admit the foot of the bed's being placed upon the axle-tree of the carriage, with

the quoin upon the bed, both their ends being even one with the other. N. B. When levelled for firing, the bed is to be laſhed to the bolt which ſupports the inner end of it, that it may not be thrown out of its place by the violence of the gun's motion, when hot with frequent diſcharges.

4. “ Take out your tompions.” The tompion is to be taken out of the gun's mouth, and left hanging by its laniard.

5. “ Run out your guns.” With the tackles hooked to the upper bolts of the carriage, the gun is to be bowſed out as cloſe as poſſible, without the aſſiſtance of crows or hand ſpikes ; taking care at the ſame time to keep the breeching clear of the trucks, by hauling it through the rings ; it is then to be bent ſo as to run clear when the gun is fired. When the gun is out, the tackle falls are to be laid along-ſide the carriages in neat fakes, that, when the gun by recoiling overhauls them, they may not be ſubject to get foul, as they would if in a common coil.

6. “ Prime.” If the cartridge is to be pierced with the priming-wire, and the vent filled with powder, the pan alſo is to be filled ; and the flat ſpace, having a ſcore through it at the end of the pan, is to be covered, and this part of the priming is to be bruiſed with the round part of the horn. The apron is to be laid over, and the horn hung up out of danger from the flaſh of the priming.

7. “ Point your guns.” At this command the gun is, in the firſt place, to be elevated to the height of the object, by means of the ſide-ſights ; and then the perſon pointing is to direct his fire by the upper ſight, having a crow on one ſide and a hand-ſpike on the other, to heave the gun by his direction till he catches the object.

N. B. The men who heave the gun for pointing are to ſtand between the ſhip's ſide and their crows or hand-ſpikes, to eſcape the injury they might otherwiſe receive from their being ſtruck againſt them, or ſplintered by a ſhot ; and the man who attends the captain with a match is to bring it at the word, “ Point your guns,” and kneeling upon one knee oppoſite the train-truck of the carriage, and at ſuch a diſtance as to be able to touch the priming, is to turn his head from the gun, and keep blowing gently upon the lighted match to keep it clear from aſhes. And as the miſſing of an enemy in action, by neglect or want of coolneſs, is moſt inexcuſable, it is particularly recommended to have the people thoroughly inſtructed in pointing well, and taught to know the ill conſequences of not taking proper means to hit their mark; wherefore they ſhould be made to elevate their guns to the utmoſt nicety, and then to point with the ſame exactneſs, having caught the object thro' the upper-ſight. At the word,

8. “ Fire,” the match is inſtantly to be put to the bruiſed part of the priming ; and when the gun is diſcharged the vent is to be cloſed, in order to ſmother any ſpark of fire that may remain in the chamber of the gun ; and the man who ſpunges is immediately to place himſelf by the muzzle of the gun in readineſs ; when, at the next word,

9. “ Spunge your gun,” the ſpunge is to be rammed down to the bottom of the chamber, and then twiſted round, to extinguiſh effectually any remains of fire ; and, when drawn out, to be ſtruck againſt the out-ſide of the muzzle, to ſhake off any ſparks or ſcraps of the cartridge that may have come out with it ; and next, its end is to be ſhifted ready for loading ; and while this is doing, the man appointed to provide a cartridge is to go to the box, and by the time the ſpunge is out of the gun, he is to have it ready ; and at the word,

10. “ Load with cartridge,” the cartridge (with the bottom end firſt, ſeam downwards, and a wad after it) is to be put into the gun, and thruſt a little way within the mouth, when the rammer is to be entered : the cartridge is then to be forcibly rammed down ; and the captain at the ſame time is to keep his priming-wire in the vent, and, feeling the cartridge, is to give the word *home*, when the rammer is to be drawn, and not before. While this is doing, the man appointed to provide a ſhot is to provide one (or two, according to the order at that time) ready at the muzzle, with a wad likewiſe; and when the rammer is drawn, at the word,

11. “ Shot your guns,” the ſhot and wad upon it are to be put into the gun, and thruſt a little way down, when the rammer is to be entered as before. The ſhot and wad are to be rammed down to the cartridge, and there have a couple of forcible ſtrokes ; when the rammer is to be drawn, and laid out of the way of the guns and tackles, if the exerciſe or action is continued ; but if it is over, the ſpunge is to be ſecured in the place it is at all times kept in.

12. “ Put in your tompions.” The tompions to be put into the muzzle of the cannon.

13. “ Houſe your guns.” The ſeizing is to be put on again upon the clinched end of the breeching, leaving it no ſlacker than to admit of the guns being houſed with eaſe. The quoin is to be taken from under the breech of the gun, and the bed, ſtill reſting upon the bolt, within the carriage, thruſt under, till the foot of it falls off the axle-tree, leaving it to reſt upon the end which projects out from the foot. The metal is to be let down upon this. The gun is to be placed exactly ſquare; and the muzzle is to be cloſe to the wood, in its proper place for paſſing the muzzle-laſhings.

14. “ Secure your guns.” The muzzle-laſhings muſt firſt be made ſecure, and then with one tackle (having all its parts equally taught with the breeching) the gun is to be laſhed. The other tackle is to be bowſed taught, and by itſelf made faſt, that it may be ready to caſt off for laſhing a ſecond breeching. N. B. Care muſt be taken to hook the firſt tackle to the upper bolt of the carriage, that it may not otherwiſe obſtruct the reeving of the ſecond breeching, and to give the greater length to the end part of the fall. No pains muſt be ſpared in bowſing the laſhing very taught, that the gun may have the leaſt play that is poſſible, as their being looſe may be productive of very dangerous conſequences. The quoin, crow, and hand-ſpike, are to be put under the gun, the powder-horn hung up in its place, &c.

Being engaged at any time when there is a large ſwell, a rough ſea, or in ſqually weather, &c. as the ſhip may be liable to be ſuddenly much heeled, the port-tackle fall is to be kept clear, and (whenever the working of the gun will admit of it) the man charged with that office is to keep it in his hand; at the ſame time the muzzle laſhing is to be kept faſt to the ring of the port, and, being hauled taught, is to be faſtened to the eye-bolt over the port-hole, ſo as to be out of the gun's way in firing, in order to haul it in at any time of danger.

This precaution is not to be omitted, when engaging to the windward, any more than when to the leeward, thoſe ſituations being very ſubject to alter at too ſhort a warning.

A train-tackle is always to be made uſe of with the lee-guns, and the man ſtationed to attend it is to be very careful in preventing the gun's running out at an improper time.

Exercise, may alſo be applied with propriety to the forming our fleets into orders of ſailing, lines of battle, &c. an art which the French have termed *evolutions*, or *tactiques*. In this ſenſe exerciſe may be defined, the execution of the movements which the different orders and diſpoſition of fleets occaſionally require, and which the ſeveral ſhips are directed to perform by means of ſignals. See Tactics.

Exercises, are alſo underſtood of what young gentlemen learn in the academies and riding-ſchools, ſuch as fencing, drawing, riding the great horſe, &c.

How uſeful, how agreeable ſoever, ſtudy may be to the mind, it is very far from being equally ſalutary to the body. Every one obſerves, that the Creator has formed an intimate connexion between the body and the mind; a perpetual action and reaction, by which the body inſtantly feels the diſorders of the mind, and the mind thoſe of the body. The delicate ſprings of our frail machines loſe their activity and become enervated, and the veſſels are choked by obſtructions when we totally deſiſt from exerciſe, and the conſequences neceſſarily affect the brain: a more ſtudious and ſedentary life is therefore equally prejudicial to the body and the mind. The limbs likewiſe become ſtiff; we contract an aukward conſtrained manner; a certain diſguſtful air attends all our actions, and we are very near being as diſagreeable to ourſelves as to others. An inclination to ſtudy is highly commendable; but it ought not, however, to inſpire us with an averſion to ſociety. The natural lot of man is to live among his fellows: and whatever may be the condition of our birth, or our ſituation in life, there are a thouſand occaſions where a man muſt naturally deſire to render himſelf agreeable; to be active and adroit; to dance with a grace; to command the fiery ſteed; to defend himſelf againſt a brutal enemy; to preſerve his life by dexterity; as by leaping, ſwimming, &c. Many rational cauſes have therefore given riſe to the practice of particular exerciſes, and the moſt ſagacious and benevolent legiſlators have inſtituted, in their academies and univerſities, proper methods of enabling youth, who devote themſelves to ſtudy, to become expert alſo in laudable exerciſes.

EXERCITOR, in Scots law, he who employs a ſhip in trade, whether he be owner, or only freights her from the owner.

EXERGESIA. See Oratory, n° 90.

EXERGUM, among antiquarians, a little ſpace around or without the figures of a medal, left for the inſcription, cipher, device, date, &c.

EXETER, the capital city of Devonſhire, ſituated on the river Ex, ten miles north of the Britiſh channel: W. Long. 3. 40. N. Lat. 50. 44. Anciently the name of this city was *Iſex*, and *Iſia Dumnoniorum.* The preſent name is a contraction of *Exceſter*, that is, a city upon the Ex. It is large, populous, and wealthy, with gates, walls, and ſuburbs: the circumference of the whole is about two miles, being well ſupplied with water brought in pipes from the neighbourhood. The city is a county of itſelf; and the magiſtrates have extenſive powers with reſpect to the admiſtration of juſtice, both in civil and criminal caſes. Formerly the ſea flowed up to the city-walls, and ſhips loaded and unloaded at the water-gate; but the navigation of the river was ſo obſtructed by the wears made in it by Hugh Courtenay earl of Devon, that the merchants brought their goods from Topſham by land. A channel, however, hath been ſince cut through the dams, and veſſels of 150 tons now come up to the key. There is a prodigious woollen manufacture in this city, of ſerges, perpetuanas, long ells, druggets, and kerſeys. A large market is kept here once a-week, in which goods are ſometimes ſold to the amount of L. 60,000.

EXFOLIATION, a term uſed by ſurgeons for the ſcaling of a bone, or its riſing and ſeparating into thin laminæ or ſcales.

EXHALATION, a general term for all effluvia or ſteams raiſed from the ſurface of the earth in form of vapour.

EXHIBIT, in law, is where a deed, or other writing, being produced in a chancery ſuit to be proved by witneſſes, the examiner, or commiſſioner appointed for the examination of any ſuch, certifies on the back of the deed or writing, that the ſame was ſhewn to the witneſs at the time of his examination, and by him ſworn to.

EXIGENT, in law, a writ which lies where the defendant in a perſonal action cannot be found, nor any effects of his within the county, by which he may be attached or diſtrained.

EXIGENTERS, four officers in the court of common-pleas, who make all exigents and proclamations, in all actions where proceſs of outlawry lies. Writs of ſuperſedeas, as well as the prothonotaries upon exigents, were likewiſe drawn up in their office.

EXILE. See Banishment.

Among the Romans, the word *exile*, *exilium*, properly ſignified an interdiction, or excluſion from water and fire; the neceſſary conſequence of which was, that the interdicted perſon muſt betake himſelf into ſome other country, ſince there was no living without fire and water.—Thus, Cicero *ad Herenn.* obſerves, that the form of the ſentence did not expreſs *exile*, but only *aquæ & ignis interdictio*. The ſame author remarks, that exile was not properly a puniſhment; but a voluntarily flying, or avoiding the puniſhment decreed: *Exilium non eſſe ſupplicium, ſed perfugium, partuſque ſupplicii.* He adds, that there was no crime among the Romans, as among other nations, puniſhed with exile; but exile was a recourſe people flew voluntarily to, in order to avoid chains, ignominy, ſtarving, &c.

The Athenians frequently ſent their generals and great men into exile, out of envy of their merits, or diſtruſt of their too great authority *.

* See
ciſm.

EXISTENCE, that whereby any thing has an actual eſſence, or is ſaid to *be*. See Metaphysics, n° 220, &c.

EXOCOETUS, or the Flying-Fish, in ichthyology, a genus belonging to the order of abdominales. The head is ſcaly, and it has no teeth. It has 10 radii in the branchioſtege membrane; the body is whitiſh, and the belly is angular: the pectoral fins, the inſtruments of flight, are very large. When purſued by any other fiſh, it raiſes itſelf from the water by means of theſe long fins, and flies in the air to a conſiderable diſtance, till the fins dry, and then it falls down into the water. It is a fiſh that ſeems to lead a moſt miſerable life. In its own element, it is perpetullay haraſſed by the dorados and other fiſh of prey. If it endeavours to avoid them by having recourſe to the air, it either meets its fate from the gulls, or the albatroſs, or is forced down again into the mouth of the inhabitants of the water, who, below, keep pace with its aerial excurſion. Neither is it unfrequent that whole ſhoals of them fall on board of ſhips that navigate the ſeas in warm climates. It is therefore apparent, that nature in this creature hath ſupplied it with inſtruments which frequently bring it into the deſtruction it ſtrives to avoid, by having recourſe to an element unnatural to it.

ee Pl. CII. g. 7.

EXODIARY, in the ancient Roman tragedy, was the perſon who, after the drama or play was ended, ſung the Exodium.

EXODIUM, in the ancient Greek drama, one of the four parts or diviſions of tragedy, being ſo much of the piece as included the cataſtrophe and unravelling of the plot, and anſwering nearly to our fourth and fifth acts.

Exodium, among the Romans, conſiſted of certain humorous verſes rehearſed by the exodiary at the end of the Fabulæ Atellanæ.

Exodium, in the Septuagint, ſignifies the end or concluſion of a feaſt. Particularly it is uſed for the eighth day of the feaſt of tabernacles, which, it is ſaid, had a ſpecial view to the commemoration of the *exodus* or departure out of Egypt.

EXODUS, a canonical book of the Old Teſtament; being the ſecond of the pentateuch, or five books of Moſes.

It is ſo called from the Greek [*exodos*], the "going out" or departure of the children of Iſrael from the land of Egypt; the hiſtory of which is delivered in this book, together with the many miracles wrought on that occaſion.

EXOMPHALUS, in ſurgery, called alſo *omphalocele*, and *hernia umbilicalis*, is a preternatural tumour of the abdomen, at the navel, from a rupture or diſtenſion of the parts which inveſt that cavity *.

EXORCISM, among eccleſiaſtical writers, the expelling devils from perſons poſſeſſed, by means of conjurations and prayers.

Exorciſm makes a conſiderable part of the ſuperſtition of the church of Rome, the rituals of which forbid the exorciſing any perſon without the biſhop's leave.

The ceremony is performed at the lower end of the church, towards the door. The exorciſt firſt ſigns the poſſeſſed perſon with the ſign of the croſs, makes him kneel, and ſprinkles him with holy water. Then follow the litanies, pſalms, and prayer; after which the exorciſt aſks the devil his name, and adjures him by the myſteries of the Chriſtian religion not to afflict the perſon any more: then, laying his right hand on the dæmoniac's head, he repeats the form of exorciſm, which is this: "I exorciſe thee, unclean ſpirit, in the name of Jeſus Chriſt: tremble, O Satan! thou enemy of the faith, thou foe of mankind, who haſt brought death into the world, who haſt deprived men of life, and haſt rebelled againſt juſtice; thou ſeducer of mankind, thou root of evil, thou ſource of avarice, diſcord, and envy."

The Romaniſts likewiſe exorciſe houſes and other places, ſuppoſed to be haunted by unclean ſpirits; and the ceremony is much the ſame with that for perſons poſſeſſed.

EXORCISTS, in church-hiſtory, an order of men, in the ancient church, whoſe employment it was to exorciſe or caſt out devils. See the preceding article.

EXORDIUM, in oratory, is the preamble or beginning, ſerving to prepare the audience for the reſt of the diſcourſe.

Exordiums are of two kinds, either juſt and formal, or vehement and abrupt. The laſt are moſt ſuitable on occaſions of extraordinary joy, indignation, or the like. See Oratory, n° 26.

EXOTIC, an appellation denoting a thing to be the produce of foreign countries.

EXPANSION, among metaphyſicians, denotes the idea we have of laſting diſtance, all whoſe parts exiſt together.

Expansion, in phyſiology, the ſwelling or increaſe of the bulk of bodies when heated. See Fire and Heat.

EXPECTORANTS, in pharmacy, medicines which promote Expectoration.

EXPECTORATION, the act of evacuating or bringing up phlegm or other matters out of the trachea, lungs, &c. by coughing, hauking, ſpitting, &c.

EXPERIENCE, a kind of knowledge acquired by long uſe, without any teacher. See Metaphysics, n° 26, 28.

EXPERIMENT, in philoſophy, is the trial of the reſult or effect of the applications and motions of certain natural bodies, in order to diſcover ſomething of their motions and relations, whereby to aſcertain ſome of their phænomena, or cauſes.

EXPERIMENTAL PHILOSOPHY;

THAT philoſophy which proceeds on experiments, which deduces the laws of nature, and the properties and powers of bodies, and their actions upon each other, from ſenſible experiments and obſervations.

I. It is not very long ſince this ſcience has been known to the world, or, to ſpeak more properly, ſince it was firſt reduced into a ſyſtem. Natural philoſophy has been, for theſe 50 centuries, nothing more than a confuſed heap of ſyſtems laid one upon another, and very frequently the one claſhing againſt the other. Each philoſopher thought, that he had an equal right to erect a ſimilar edifice to his own memory. They adopted barbarous terms and expreſſions, that conveyed confuſed ideas only. For explications, they gave certain unintelligible or unmeaning words, which had been introduced by the authority of ſome celebrated name, but from which a man of underſtanding could not receive the leaſt information. At length, the true phyſics was brought to light; it was drawn from the obſcurity of the ſchools, where it had grown old under the authority of Ariſtotle, and ſcarce any thing been ſuffered to remain of it but the name. This reformation proceeded principally from the manner of ſtudying it. Inſtead of gueſſing at it, they began to inveſtigate it by experiments; and whereas they formerly confined themſelves to ſpeculations, and vague reſearches concerning phenomena and their cauſes, that were always merely conjectural, they now gave ocular demonſtrations of cauſes and effects by means of experiments; and this is what they call *experimental philoſophy*.

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II. The principles of this philoſophy are as follow. All the material ſubſtances, whoſe aſſemblage compoſes the univerſe, are called *natural bodies*. What we perceive in theſe ſubſtances that is uniform and invariable, and of which we do not know the cauſe, is called their *properties*. Phyſics ſets out with this, as from a fixed point, in order to explain the different phenomena that are perceived on the earth, in the water, the air, or fire, and in all that theſe elements contain. For though it does not pretend to know all that bodies have in common among themſelves, or all that is peculiar to each one of them; yet it knows a certain number of their properties, which it regards as primary, till it diſcovers a precedent cauſe of which they may be the effect; and which properties are general, and in a manner inſeparable from all matter, as for example, *extenſion*. There are likewiſe properties of an inferior order, which do not appertain to all bodies but as they are in certain ſtates, or under certain circumſtances: theſe, in general, are nothing more than combinations of the primary properties; and form a ſecond claſs, as for example, *fluidity*. Laſtly, theſe properties of the firſt and ſecond order combine more and more, and become common to a ſtill ſmaller number of bodies: and here they are no longer extended to all bodies, as the firſt; nor are peculiar to certain ſtates, as the ſecond; but are confined to genders, ſpecies, or even individuals. Such are ſeveral properties of the air, fire, light, metals, the magnet, &c. Theſe three orders of properties are the ſubject of the inquiries of experimental philoſophy, which proves by experiments thoſe that are already known, and frequently diſcovers others that were unknown.

III. It is neceſſary here to deſcend to ſome particulars. The firſt property of bodies, which preſents itſelf to our ideas and our ſenſes, is their extenſion; which is a limited bulk of any form whatever, of which we can conceive parts that may be diſtinguiſhed from each other. This material extenſion has three dimenſions, which are length, breadth, and depth. Every body, whoſe extenſion is large enough to be ſeen or felt, may be divided into ſeveral parts, and which muſt conſequently decreaſe in proportion as the diviſion is increaſed: from hence comes the infinite diviſibility of matter, at leaſt in idea; for in the ſmalleſt particle we can ſtill imagine two halves, though the fact has never been proved by experiment; for nature does not at all times conform to imagination, ſeeing that the minuteſt particles, and their decompoſition, eſcape our obſervation even in the moſt accurate experiments. However, we ſhould never have believed, without having made the trial, to what degree experimental philoſophy is capable of dividing bodies, and of reducing them to particles that are almoſt indiviſible.

IV. The order, or arrangement, which the ſurfaces of bodies take among themſelves, is called their *figures*. As theſe ſurfaces cannot be confounded, but are always diſtinguiſhable by their ſituations, it is evident that figure is a common and neceſſary property of all bodies. The experiments by which this truth is demonſtrated by the aid of the microſcope, are equally curious and convincing: and from hence it is alſo proved, that there are no two bodies that are abſolutely ſimilar. The ſolidity of a body is nothing more than the quantity of matter that is contained within its bulk: this property is eſſential to all bodies, and the moſt certain ſign of their exiſtence. Reſiſtance is a neceſſary conſequence of the foregoing property; and every phyſical reſiſtance proves a real ſolidity in a greater or leſs degree. Fluids being the only bodies in which ſolidity is in any manner neceſſary to be proved, it has been there demonſtrated by numberleſs experiments. The poroſity of bodies is, on the contrary, nothing but that ſpace which is found between their ſolid parts. This ſpace has its degrees. When a dry ſponge is plunged into water, a quantity of air comes out of it, in proportion to the water that penetrates it: and when moiſt bodies are dried, they become more light in proportion as they loſe by evaporation what their poroſity had admitted. This is the firſt ſort of ſpace or vacuum. Light, or the matter of fire that we ſee paſs through bodies impenetrable to air and water, ſuppoſes pores more delicate, and a ſpace more ſubtile. It is almoſt indubitable, that after theſe firſt kinds of vacuum, and which indeed are improperly ſo called, as they are filled with other matter, there are others ſtill ſmaller, and which are ſo in a literal ſenſe. That freedom, which is requiſite to motion, ſeems to prove it: for though we may ſay, matter being diviſible almoſt *ad infinitum*, that a body or ſubſtance more ſolid may move in another ſubſtance that is more ſubtile, and that will give way to its motion, we muſt nevertheleſs have recourſe to a laſt reſort, and admit of an ultimate vacuum, which will give room ſufficient to the leaſt corpuſcle, that its part *A* may take the place of its part *B*, without the leaſt reſiſtance: beſides, it is not to be imagined, that nature, in fact, admits of that infinite diviſibility which our imagination can conceive, and that every thing which is poſſible in idea is at all times practicable. All that exiſts is poſſible, but all that is poſſible does not however exiſt. The air-pump is of very great uſe in proving theſe three ſorts of vacuums. By denſity, is underſtood the proportion between the extenſion and ſolidity of a body: one body therefore is more denſe than another, when, under the ſame degree of extenſion, it contains more ſolid matter: and this quality ariſes from condenſation and compreſſion. Elaſticity is nothing more than that effort by which certain bodies, when compreſſed, endeavour to reſtore themſelves to their former ſtate; and this property ſuppoſes them compreſſible. As all theſe natural properties of bodies are of great utility in explaining the principles of phyſics, and in applying them to all the arts, experimental philoſophy proves their reality by a thouſand examples.

V. We diſcover ſtill other properties in bodies; ſuch as mobility, which we muſt not here confound with motion. This mobility ariſes from certain diſpoſitions which are not in an equal degree in all bodies; from whence it comes that ſome are more eaſily moved than others: and this proceeds from the reſiſtance to motion which is perceived in all bodies, having regard merely to their maſſes; and this reſiſtance is called *vis inertiæ*, or *inert force*. A body is ſaid to be in motion, when it is actually moving from one place to another; or, whenever a body changes its ſituation with regard to the objects that ſurround it, either nearly or remotely, it is ſaid to be in motion. There are three principal matters to be conſidered in a moving body; its direction, its velocity, and the quantity of its motion: and here phyſics explains the force or moving power; it likewiſe diſtinguiſhes between ſimple and compound motion. Simple motion is that which ariſes from only one force, or which tends to only one point. It deſcribes the laws, and explains the reſiſtance, of mediums; the reſiſtance of friction; the difficulties of a perpetual motion; the alteration of direction, occaſioned by the oppoſition of a fluid matter; reflected or reverberated motion; the communication of motion by the ſhock of bodies, &c. Compound motion is that of a body impelled to move by ſeveral cauſes or powers which act according to their different directions. Phyſics here likewiſe inveſtigates the laws of motion; and is particularly applied to the explaining, under this head, what are called the *central forces*, which produce a motion that is either circular or in a curve line, and which inceſſantly urge the moving body either to approach or recede from the centre. To diſtinguiſh theſe from each other, the former is called the *centripetal force*, and the latter the *centrifugal force*.

VI. By gravity, or ponderoſity, is to be underſtood that force which occaſions bodies to paſs from a higher to a lower place, when nothing oppoſes their courſe, or when the obſtacles are not ſufficient to ſtop them. Speculative philoſophy inveſtigates its cauſe, and perhaps in vain. Experimental philoſophy contents itſelf with deſcribing the phenomena, and teaching the laws of gravity, which are thoroughly eſtabliſhed by a thouſand reiterated experiments. In order properly to underſtand this ſubject, we muſt take care not to confound the term *gravity* with that of *weight*. By the former, we underſtand that force which urges bodies to deſcend through a certain ſpace in a given time. By the latter, is meant the quantity of a heavy body that is contained under the ſame bulk. The phenomena are explained by the experiments themſelves, and by inferences deduced from them.

VII. Hydroſtatics is a ſcience whoſe object is the gravity and equilibrium of fluids in particular. Tho' the gravity of theſe bodies is the ſame with that of others, and is ſubject to the ſame laws, yet their ſtate of fluidity gives riſe to particular phenomena, which it is of conſequence to know. But as hydroſtatics cannot be ſucceſsfully treated on without the aſſiſtance of calculation, it has been ranged among the mathematical ſciences. See MATHEMATICS.

VIII. We ſay the ſame with regard to mechanics; which is the art of employing, by the aid of machines, the motion of bodies, in conformity to its properties and laws, as well with regard to ſolids as fluids, either more commodiouſly or more advantageouſly.

IX. After it has made the moſt accurate experiments, and the moſt judicious obſervations, on all theſe different ſubjects, and the properties of bodies in particular, experimental philoſophy paſſes to the examination of the air, the water, fire, the wind, colours, &c. The air is a fluid with which we are ſurrounded from the inſtant of our birth, and without which we cannot exiſt. It is by the properties and the influences of the air, that nature gives increaſe and perfection to all that it produces for our wants and conveniencies; it is the ſpirit of navigation: ſound, voice, ſpeech itſelf, are nothing more than percuſſions of the air: this globe that we inhabit is completely ſurrounded by air; and this kind of coverture, which is commonly called the *atmoſphere*, has ſuch remarkable functions, that it evidently appears to concur to the mechaniſm of nature. Experimental phyſics, therefore, conſiders the air, 1. Of itſelf, independent of its bulk, and the figure of its whole body: it examines its eſſential properties; as its gravity, denſity, ſpring, &c. The air-pump is here of indiſpenſable uſe; and by this machine phyſics examines in what manner ſpace, or a vacuum, is made. It likewiſe ſhows the neceſſity of air to the preſervation of animal-life; the effect it has on ſound, fire, and gunpowder, *in vacuo;* and a hundred other experiments of various degrees of curioſity. 2. It conſiders the air as the terreſtrial atmoſphere, ſometimes as a fluid at reſt, and ſometimes as in motion. And by theſe means it accounts for the variation of the mercury in the barometer, and why it ſinks in proportion as the height of the atmoſphere diminiſhes; as alſo for the figure, the extent, and weight of the atmoſphere: it ſhews the method of determining the height of mountains, the nature of ſound in general, of its propagation, and of ſonorous bodies.

IX. It is here alſo, that experimental philoſophy conſiders the nature of the wind; which is nothing more than agitated air, a portion of the atmoſphere that moves like a current, with a certain velocity and determinate direction. This fluid, with regard to its direction, takes different names according to the different points of the horizon from whence it comes, as eaſt, weſt, north, and ſouth. Winds are likewiſe diſtinguiſhed into three ſorts; one of which is called *general* or *conſtant*, as the trade-winds, which continually blow between the tropics: another is the *periodical*, which always begin and end within a certain time of the year, or a certain hour of the day, as the monſoons, the land-breezes and ſea-breezes, which riſe conſtantly in the morning and evening; and laſtly, ſuch as are *variable*, as well with regard to their direction as their velocity and duration.

M. Mariotte computes the velocity of the moſt impetuous wind, to be at the rate of 32 feet in a ſecond, and Mr Derham makes it 66 feet in the ſame time. The firſt, doubtleſs, meant the wind of the greateſt velocity that had then come to his knowledge.

X. The force of the wind, like that of other bodies, depends on its velocity and maſs; that is, the quantity of air which is in motion: ſo the ſame wind has more or leſs force on any obſtacle that oppoſes it, in proportion as that obſtacle preſents a greater or a leſs ſurface: for which reaſon it is that they ſpread the ſails of a veſſel more or leſs, and place the wings of a windmill in different directions. The machines, by which the winds are meaſured, are called *anemometers*. They ſhew the direction, the velocity, and the duration of winds. It is by the agitations of the wind, that the air is purified; that the ſeeds of trees and herbs are conveyed to the foreſts and fields; that ſhips are driven from one pole to the other; that our mills turn upon their axes, &c.; and art, by imitating nature, ſometimes procures us artificial winds, by which we refreſh our bodies, invigorate our fires, purify our corn, &c.

XI. Water is an univerſal agent, which nature employs in all her productions. It may be conſidered as in three ſtates, 1. As a liquid; 2. As a vapour; 3. As ice. Theſe three different ſtates do not in any manner change its eſſence, but make it proper to anſwer different ends. The natural ſtate of water would be that of a ſolid body, as fat, wax, and all thoſe other bodies which are only fluid when heated to a certain degree: for water would be conſtantly ice, if the particles of fire, by which it is penetrated in the temperate climates, did not render it fluid, by producing a reciprocal motion among its parts; and, in a country where the cold is continually ſtrong enough to maintain the congelation, the aſſiſtance of art is neceſſary to make it fluid in the ſame manner as we do lead, &c. Water, when not in ice, is a fluid that is inſipid, tranſparent, without colour, and without ſmell, and that eaſily adheres to the ſurface of ſome bodies, that penetrates many, and extinguiſhes fire. Experimental philoſophy inveſtigates the origin of fountains; the cauſe of the ſaltneſs of the ſea; the means of purifying water; what is its weight, and what are its effects when heated, &c. It likewiſe examines this fluid in the ſtate of vapour; and, finds that a drop of water, when in vapour, occupies a ſpace vaſtly greater than it did before. It explains the *æolipile* and its effects; fire engines; and the force of vapours that give motion to immenſe machines in mines and elſewhere, &c. and laſtly, it conſiders water in the ſtate of ice. Ice conſequently is more cold than water; and its coldneſs increaſes if it continue to loſe that matter, already too rare, or too little active, to render it fluid. Experimental phyſics endeavours to inveſtigate the cauſes of the congelation of water, and why ice is lighter than water; from whence it derives that expanſive force by which it breaks the containing veſſel; the difference there is between the congelation of rivers and that of ſtanding waters; why ice becomes more cold by the mixture of ſalts; and many other ſimilar phenomena.

XII. The nature of fire is yet very much unknown to the moſt learned philoſophers. As objects when at a great diſtance are not perceptible to our ſenſes, ſo when we examine them too nearly, we diſcern them but confuſedly. It is ſtill diſputed whether fire be a homogene, unalterable matter, deſigned, by its preſence, or by its action, to produce heat, inflammation, and diſſolution, in bodies; or if its eſſence conſiſts in motion only, or in the fermentation of thoſe particles which we call *inflammable*, and which enter as principles, in greater or leſs quantities, in the compoſition of mixed bodies. The moſt learned inquirers into nature incline to the former opinion; and to have recourſe to a matter, which they regard as the principle of fire. They ſuppoſe that there is in nature a fluid adapted to this purpoſe, created ſuch from the beginning, and that nothing more is neceſſary than to put it in action. The numberleſs experiments which are daily made in electricity, ſeem to favour this opinion, and to prove that this matter, this fluid, this elementary fire, is diffuſed through all nature, and in all bodies, even ice itſelf. We cannot ſay to what important knowledge this great diſcovery of electricity may lead if we continue our inquiries concerning it. It appears, however, that we may believe, without any inconvenience or abſurdity, that fire and light, conſidered in their firſt principle, are one and the ſame ſubſtance differently modified.

XIII. Be this matter however as it may, experimental philoſophy is employed in making the moſt ingenious and moſt uſeful reſearches concerning the nature of fire, its propagation, and the means by which its power may be excited or augmented; concerning the phoſphorous and its inflammation; fire excited by the reflection of the ſun's rays from a mirror; and on the effects of fire in general; concerning lightning and its effects; the fuſion of metals; gunpowder and its exploſion; flame, and the aliments of fire; and an infinity of like objects which it explains, or concerning which it makes new diſcoveries, by the aid of experiments.

XIV. By the word *light*, we underſtand that agent by which nature affects the eye with that lively, and almoſt conſtantly pleaſing ſenſation, which we call *ſeeing*, and by which we diſcern the ſize, figure, colour, and ſituation of objects, when at a convenient diſtance. All philoſophers agree, that the light, which is diffuſed in any place, is a real body. But what this body is, and by what means it enters that place where it is perceived, is a queſtion about which philoſophers are divided.

XV. Experimental philoſophy is applied in diſcovering or proving, by an infinity of experiments, what is the nature of light, in what manner it is propagated, what its velocity and progreſſive motion. It alſo inveſtigates and explains the principles of *optics*, properly ſo called, and ſhows the directions which light obſerves in its motions. From thence its proceeds to the examen of the principles of catoptrics, and deſcribes the laws and effects of reflected light. It next treats of the principles of dioptrics, and explains the laws of refracted light; and laſtly, it teaches, from the principles of natural and artificial viſion, the conſtruction of optical inſtruments, as lenſes, concave mirrors, priſms, teleſcopes, &c. &c. and the uſes to which they are applied.

XVI. By reſolving or ſeparating the rays of light, philoſophy has obtained true and clear diſcoveries of the nature of colours. We are naturally led to imagine that colours, and their different degrees, make a part of the bodies that preſent them to our ſight; that white is inherent in ſnow, green in leaves and graſs, and red in a ſtuff dyed of that colour. But this is far from being true. If an object, which preſents any colour to our ſight, be not illuminated, it preſents no colour whatſoever. In the night all is black. Colours, therefore, depend on light; for without that we could form no idea of them: but they depend alſo on bodies; for of ſeveral objects preſented to the ſame light, ſome appear white, others red, blue, &c. But all theſe matters being ſeparate from our own bodies, we ſhould never acquire any ideas of them, if the light, tranſmitted or reflected by theſe objects, did not make them ſenſible to us, by ſtriking upon the organs of our ſight, and if theſe impreſſions did not revive in us thoſe ideas which we have been uſed to expreſs by certain terms. For theſe reaſons philoſophy conſiders colours from three points of view, 1. As in the light; 2. In bodies, as being coloured; and, 3. From the relation they have to our viſual faculties, which they particularly affect, and by which we are enabled to diſtinguiſh them.

It is unneceſſary in this place to ſay more either on colour in particular, or experimental philoſophy in general. The different ſubjects of this collective article are particularly treated under their proper names, in the order of the alphabet: the reader will therefore turn, as he has occaſion, to ACOUSTICS, CATOPTRICS, CHROMATICS, DIOPTRICS, HYDROSTATICS, MECHANICS, OPTICS, PNEUMATICS, ELECTRICITY, MAGNETISM, *&c. &c. &c.*——Alſo AIR, ATMOSPHERE, BURNING-*Glaſs*, COLD, COLOUR, CONGELATION, EVAPORATION, FIRE, FLAME, FLUIDTY, HEAT, IGNITION, LIGHT, SOUND, STEAM, WATER, WIND, &c.

EXPERIMENTUM CRUCIS, a capital, leading, or deciſive experiment; thus termed, either on account of its being like a croſs, or direction-poſt, placed in the meeting of ſeveral roads, guiding men to the true knowledge of the nature of that thing they are inquiring after; or, on account of its being a kind of torture, whereby the nature of the thing is as it were extorted by force.

EXPHORESIS. See ORATORY, n° 85.

EXPIATION, a religious act, by which ſatisfaction, atonement, or amends, is made for the commiſſion of ſome crime, the guilt done away, and the obligation to puniſhment cancelled.

The method of expiation among the Jews was chiefly by ſacrifice, whether for ſins of ignorance, or to purify themſelves from certain pollutions.

Great Day of EXPIATION, an annual ſolemnity of the Jews, upon the tenth day of the month Tiſri, which anſwers to our September. On this occaſion, the high-prieſt laid aſide his breaſt-plate and embroidered ephod, as being a day of humiliation. He firſt offered a bullock and a ram for his own ſins, and thoſe of the prieſts; then he received from the heads of the people two goats for a ſin-offering, and a ram for a burnt-offering, to be offered in the name of the whole multitude. It was determined by lot which of the goats ſhould be ſacrificed, and which ſet at liberty. After this he perfumed the ſanctuary with incenſe, and ſprinkled it with blood: then, coming out, he ſacrificed the goat upon which the lot had fallen. This done, the goat which was to be ſet at liberty being brought to him, he laid his hands upon its head, confeſſed his ſins and the ſins of the people, and then ſent it away into ſome deſert place: it was called *azazel*, or the *ſcape-goat*.

As to the expiations among the heathens, they were of ſeveral kinds; as ſacrifices, and religious waſhings.

EXPIATION, in a figurative ſenſe, is applied by divines to the pardon procured to mens ſins, by the merits of Chriſt's death. See the article CHRISTIANITY, n° 12.

EXPLICITE, in the ſchools, ſomething clear, diſtinct, formal, and unfolded.

EXPLOSION, in phyſics, is properly applied to the going off of gun-powder and the report made thereby. Hence it is uſed to expreſs ſuch ſudden actions of bodies as generate air inſtantaneouſly.

EXPONENT, in algebra, the ſame with index. See ALGEBRA, n° 9.

EXPONENT is alſo uſed in arithmetic, in the ſame ſenſe as index or logarithm.

EXPORTATION, the ſhipping and carrying out of the kingdom wares and commodities for other countries. See the articles COMMERCE, TRADE, and SHIPPING.

EXPOSING *of* CHILDREN, among the ancients, a barbarous cuſtom of laying down children by the ſides of the highways, and other places moſt frequented, where they were left at the mercy of the public, and where it behoved them to periſh unleſs taken up and educated by charitable and compaſſionate perſons. Many expoſed their children, merely becauſe they were not in a condition to educate them; and as for thoſe who expoſed them for other reaſons, they commonly did it with jewels, with a view no doubt to encourage thoſe who found them to take care of their education if alive, or give them human burial if dead.

EXPOSITION, in general, denotes the ſetting a thing open to public view: thus it is the Romaniſts ſay, the hoſt is *expoſed*, when ſhewn to the people.

EXPOSITION, in a literary ſenſe, the explaining an author, paſſage, writing, or the like, and ſetting their meaning in an obvious and clear light.

EXPOSITOR, or EXPOSITORY, a title given to ſmall dictionaries, ſerving to explain the hard words of a language.

EXPOSTULATION, in rhetoric, a warm addreſs to a perſon, who has done another ſome injury, repreſenting the wrong in the ſtrongeſt terms, and demanding redreſs.

EXPOSURE, in gardening, the ſituation of a garden-wall, or the like, with reſpect to the points of the compaſs, as ſouth or eaſt. See GARDENING.

EXPRESSED OILS, in chemiſtry, ſuch oils as are obtained from bodies only by preſſing. See OIL.

EXPRESSION, in rhetoric, the elocution, diction, or choice of words in a diſcourſe. See LANGUAGE, ORATORY, and POETRY.

EXPRESSION, in muſic. See COMPOSITION.

EXPRESSION, in painting, a natural and lively repreſentation of the ſubject, or of the ſeveral objects intended to be ſhewn.

The expreſſion conſiſts chiefly in repreſenting the human body and all its parts, in the action ſuitable to it: in exhibiting in the face the ſeveral paſſions proper to the figures, and obſerving the motions they impreſs on the external parts. See PAINTING, n° 15.

Expression, in reading. See Reading, Nº ix. x.

Expression *Theatrical.* See Declamation, article iv.

Expression, in pharmacy. See Pharmacy, nº 221.

EXPULSION, in a general ſenſe, the act of violently driving a perſon out of any city, ſociety, &c.

Expulsion, in medicine, the act whereby any thing is forcibly driven out of the place in which it is: thus we ſay, the expulſion of the fetus in delivery.

EXSICCATION, in pharmacy. See Pharmacy, nº 226.

EXSPIRATION, in phyſic, that part of reſpiration by which the air is expelled or driven out of the lungs. See Anatomy, nº 381. and Respiration.

EXTASY, a tranſport which ſuſpends the function of the ſenſes, by the intenſe contemplation of ſome extraordinary or ſupernatural object.

Extasy, in medicine, a ſpecies of catelepſy, when a perſon perfectly remembers, after the paroxyſm is over, the ideas he conceived during the time it laſted.

EXTENSION, in philoſophy, one of the common and eſſential properties of body; or that by which it poſſeſſes or takes up ſome part of univerſal ſpace, which is called the place of that body *.

EXTENSOR, an appellation given to ſeveral muſcles, from their extending or ſtretching the parts to which they belong. See Anatomy, *Table of the Muſcles.*

EXTENT, in law, is uſed in a double ſenſe. Sometimes it ſignifies a writ or command to the ſheriff for the valuing of lands or tenements; and ſometimes the act of the ſheriff, or other commiſſioner, upon this writ.

Old and New Extent, in Scots law. See Law, Nº clxvi. 6.

EXTERIOR, or External. See External.

EXTERMINATION, in general, the extirpating or deſtroying ſomething.

Extermination, in algebra. See Algebra, nº 19. 20.

EXTERNAL, a term of relation applied to the ſurface or outſide of a body, or that part which appears or preſents itſelf to the eye, touch, &c. in contradiſtinction to *internal.*

External is alſo uſed to ſignify any thing that is without-ſide a man, or that is not within himſelf, particularly in his mind; in which ſenſe we ſay, external objects, &c.

EXTINCTION, in general, denotes the putting out or deſtroying ſomething, as a fire or flame. See *Extinguiſhing of* Fire.

EXTINGUISHMENT, in law, is a conſolidation or union, as where one has due to him a yearly rent out of lands, and afterwards purchaſes the lands out of which the rent ariſes; in this caſe, both the property and the rent being united in one poſſeſſor, the rent is ſaid to be extinguiſhed.

EXTIRPATION, the ſame with extermination. See Extermination.

EXTISPEX, in antiquity, the perſon who drew preſages from viewing the intrails of animals offered in ſacrifice.

EXTORTION, in law, is an illegal manner of wreſting any thing from a man, either by force, menace, or authority. It is alſo the exaction of unlawful uſury, winning by unlawful games, and taking more than is due under pretence of right, as exceſſive tolls in millers, &c.

At the common law, extortion is puniſhable by fine and impriſonment; and the ſtatute of 3 Eliz. 1. *c.* 30. has enacted, that officers of juſtice guilty of extortion for the expedition of buſineſs, &c. ſhall render to the party treble value. There are likewiſe divers other ſtatutes for puniſhing extortions of ſheriffs, bailiffs, goalers, clerks of the aſſiſe and of the peace, attornies, ſolicitors, &c.

EXTRACT, in pharmacy, is a ſolution of the purer parts of a mixed body inſpiſſated, by diſtillation or evaporation, nearly to the conſiſtence of honey *.

Extract, in matters of literature, is ſomething copied or collected from a book or paper.

EXTRACTION, in chemiſtry and pharmacy, the operation by which eſſences, tinctures, &c. are drawn from natural bodies. See Extract.

Extraction, in ſurgery, is the drawing any foreign matter out of the body by the hand, or by the help of inſtruments. See Surgery.

Extraction, in genealogy, implies the ſtock or family from which a perſon is deſcended.

Extraction *of Roots*, in algebra and arithmetic. See Algebra, and Arithmetic.

EXTRACTOR, in midwifery, an inſtrument or forceps, for extracting children by the head. See Midwifery.

EXTRAVAGANTES, thoſe decretal epiſtles which were publiſhed after the Clementines.

They were ſo called, becauſe, at firſt, they were not digeſted, or ranged, with the other papal conſtitutions, but ſeemed to be, as it were, detached from the canon law. They continued to be called by the ſame name when they were afterwards inſerted in the body of the canon law. The firſt extravagantes are thoſe of John XXII. ſucceſſor of Clement V. The laſt collection was brought down to the year 1483, and was called the *common extravagantes*, notwithſtanding that they were likewiſe incorporated with the reſt of the canon law.

EXTRAVASATION, in contuſions, fiſſures, depreſſions, fractures, and other accidents of the cranium, is when one or more of the blood-veſſels, that are diſtributed in the dura mater, is broke or divided, whereby there is ſuch a diſcharge of blood as greatly oppreſſes the brain, and diſturbs its office; frequently bringing on violent pains, and other miſchiefs; and at length death itſelf, unleſs the patient is timely relieved. See Surgery and Medicine.

EXTREMES, in logic, the terms expreſſing the two ideas whoſe relation we inquire after in a ſyllogiſm.

Extreme *Unction.* See Unction.

EXTRINSIC, among metaphyſicians, is taken in various ſenſes. Sometimes it ſignifies a thing's not belonging to the eſſence of another; in which ſenſe, the efficient cauſe and end of a thing are ſaid to be extrinſic. Sometimes it ſignifies a thing's not being contained within the capacity of another; in which ſenſe, thoſe cauſes are called extrinſic which introduce ſomething into a ſubject from without, as when a fire introduces heat. Sometimes it ſignifies a thing added, or applied, to another; in which ſenſe accidents and adherents are ſaid to be extrinſic to the ſubjects to which they adhere. Sometimes the viſion is ſaid to be extrinſic from ſome form which does not exiſt in that thing, but is adjacent to it, or by ſome means or other without it.

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* See *Metaphyſics*, nº 56.

* See *Pharmacy*, nº 603, &c.

EXULCERATION, in ſurgery. See Ulcer.

EXUVIÆ, among naturaliſts, denote the caſt-off parts or coverings of animals, as the ſkins of ſerpents, caterpillars, and other inſects.

EYE, in anatomy. See Anatomy, n° 406.

Bull's Eye, in aſtronomy. See Aldebaran.

Eye *of a Block*, in naval affairs, that part of the rope-ſtrop which is faſtened to ſome neceſſary place in the ſhip: the ſtrop is a ſort of wreath or rope formed into a ring, and fixed round the block for the double convenience of ſtrengthening the block, and faſtening it in any place where it is wanted.

Eye, in agriculture and gardening, ſignifies a little bud or ſhoot, inſerted into a tree by way of graft. See Engrafting.

Eye *of a Tree*, a ſmall pointed knot to which the leaves ſtick, and from which the ſhoots or ſprigs proceed. See Gemma.

Eye-*Bright*. See Euphrasia.

EYRAC, or Irac, Arabia, a province of Turky in Aſia, 345 miles in length, and 190 in breadth; of which Bagdad is the capital.

Eyrac *Agemi*, the principal province of Perſia, anciently called Parthia.

EYRE, or Eire, in law, the court of itinerant juſtices. See Assize.

EYRIE, in falconry, a brood or neſt, a place where hawks build and hatch their young.

EZEKIEL, a canonical book of the Old Teſtament, referring chiefly to the degenerate manners and corruptions of the Jews of thoſe times.

It abounds with fine ſentences and rich compariſons, and diſcovers a good deal of learning in profane matters.

Ezekiel was carried captive to Babylon with Jechoniah, and began his prophecies in the fifth year of the captivity. He was cotemporary with Jeremiah, who propheſied at the ſame time in Judea. He foretold many events, particularly the deſtruction of the temple, the fatal cataſtrophe of thoſe who revolted from Babylon to Egypt, and the happy return of the Jews to their own land.

EZRA, a canonical book of the Old Teſtament; comprehending the hiſtory of the Jews from the time of Cyrus's edict for their return, to the 20th year of Artaxerxes Longimanus. It ſpecifies the number of Jews who returned, and Cyrus's proclamation for the rebuilding the temple, together with the laying its foundation, the obſtruction it met with, and the finiſhing thereof in the reign of Darius.

The illuſtrious author of this book was alſo the reſtorer and publiſher of the canon of the Old Teſtament. See Bible.

F.

F, THE fourth conſonant, and ſixth letter of the alphabet. The letter F is borrowed from the digamma or double gamma of the Ælians, as is evident from the inſcription on the pedeſtal of the Coloſſus at Delos; and was undoubtedly formed from the old Hebrew vau: and tho' this letter is not found in the modern Greek alphabet, yet it was in the ancient one, from whence the Latins received it, and tranſmitted it to us.

It is formed by a ſtrong expreſſion of the breath, and joining at the ſame time the upper-teeth and under-lip. It has but one ſort of ſound, which has a great affinity with *v* and *ph*, the latter being written for it by us in all Greek words, as *philoſophy*, &c. tho' the Italians write it *filoſofia*.

The Romans for ſome time uſed an inverted F, Ⅎ, inſtead of V conſonant, which had no peculiar figure in their alphabet. Thus, in inſcriptions we meet with TERMINAℲIT, DIℲI, &c. Lipſius and others ſay, that it was the emperor Claudius who introduced the uſe of the inverted digamma, or Ⅎ: but it did not long ſubſiſt after his death; for Quintilian obſerves, that it was not uſed in his time.

F, or fa, in muſic, is the fourth note in riſing in this order of the gamut, *ut*, *re*, *mi*, *fa*. It likewiſe denotes one of the Greek keys in muſic, deſtined for the baſs.

F, in phyſical preſcriptions ſtands for *Fiat*, or "Let it be done." Thus *f. s. a.* ſignifies *fiat ſecundum artem*.

F was alſo a numeral letter, ſignifying 40; according to the verſe,

Sexta quaterdenos gerit quæ diſtat ab alpha.

And when a daſh was added at top, thus F̄, it ſignified forty thouſand.

F, in the civil law. Two f's joined together thus *ff*, ſignify the pandects. See Pandects.

F, in criminal law, a ſtigma or brand put upon felons with a hot iron, on their being admitted to the benefit of clergy; by ſtat. 4 H. 7. c. 13.

FABA, in botany. See Vicia.

Faba *Sancti Ignatii*. See Ignatius's *Bean*.

FABAGO, in botany. See Sygophyllum.

FABER, in ichthyology. See Zeus.

FABIAN (Robert), an alderman of the city of London, and ſheriff in the year 1494; was a perſon of learning for the time he lived in, a good poet, and author of a Chronicle of England and France, intitled *The Concordaunce of Stories*, in two volumes folio, beginning with Brute, and ending with the 20th of Henry VII. 1504. It contains ſeveral curious particulars relative to the city of London, not elſewhere to be found. Stowe calls it "a painful labour, to the great honour of the city and of the whole realm." We are told that Cardinal Wolſey cauſed as many copies of this book, as he could procure, to be burned, becauſe the author had made too clear a diſcovery of the large revenues of the clergy. Fabian died in 1512.

Fabius *Maximus* (Quintus), one of the greateſt generals of his time, was ſurnamed *Cunctator*, becauſe being created dictator, after the battle of Traſimene, in the 217th year before the Chriſtian æra, he found means to weary out Hannibal without fighting, by encamping in the moſt advantageous manner, and inceſſantly harraſſing him. Hannibal ſent him word, that "If he was as great a captain as he would be thought, he ought to come into the plain and give him battle." But Fabius coldly replied, "That if he was as great a captain as he would be thought, he would do well to force him to fight." Fabius was five times conſul; and performed ſuch great ſervices for his country, that he was called *The Buckler of the Republic*. See *(Hiſtory of)* Rome.

Fabius, ſtyled *Pictor*, a Roman general and hiſtorian. He firſt introduced painting at Rome; and having cauſed the walls of the temple of Health to be painted, ſome authors have erroneouſly reckoned him a painter. Died about 216 B. C.

FABLE, a tale, or feigned narration, deſigned either to inſtruct or divert, diſguiſed under the allegory of an action, &c.

Fables were the firſt pieces of wit that made their appearance in the world; and have continued to be highly valued, not only in times of the greateſt ſimplicity, but in the moſt polite ages of the world. Jotham's fable of the trees is the oldeſt that is extant, and as beautiful as any that have been made ſince. Nathan's fable of the poor man is next in antiquity. We find Æſop in the moſt diſtant ages of Greece; and in the early days of the Roman commonwealth, we read of a mutiny appeaſed by the fable of the belly and the members. As fables had their riſe in the very infancy of learning, they never flouriſhed more than when learning was at its greateſt height; witneſs Horace, Boileau, and Fontaine.

Fable is the fineſt way of giving counſel, and moſt univerſally pleaſing, becauſe leaſt ſhocking; for, in the reading of a fable, a man thinks he is directing himſelf, whilſt he is following the dictates of another, and conſequently is not ſenſible of that which is the moſt unpleaſing circumſtance in advice. Beſides, the mind is never ſo much pleaſed as when ſhe exerts herſelf in any action that gives her an idea of her own abilities; this natural pride of the ſoul is very much gratified in the reading of fable.

Fable, is alſo uſed for the plot of an epic or dramatic poem; and is, according to Ariſtotle, the principal part, and, as it were, the ſoul of the poem *.

FABRI (Honorius), a laborious jeſuit born in the dioceſe of Bellay, diſtinguiſhed himſelf by his ſkill in philoſophy and the mathematics, and by writing a great number of books. The moſt curious of which treat of geometry, optics, the loadſtone, the motion of the earth, the ebbing and flowing of the ſea, &c. He died at Rome, in 1688.

FABRIC, in general, denotes the ſtructure or conſtruction of any thing; but particularly of buildings, as a church, hall, houſe, &c. See Architecture.

Fabric-*Lands*, thoſe formerly given towards rebuilding or repairing of cathedrals and other churches; for anciently almoſt every body gave more or leſs, by his will, to the fabric of the pariſh-church where he dwelt.

FABRICIUS, the celebrated Roman conſul and general; not leſs memorable for his incorruptible integrity, in rejecting immenſe bribes proffered to induce him to betray or quit the ſervice of his country. Neither would he give bribes to take off his enemy by baſe means. See *(Hiſtory of)* Rome.

Fabricius (George), a learned German, born at Chenmitz in Miſnia, in 1516. After a liberal education, he viſited Italy in quality of a tutor to a young nobleman; and, examining all the remains of antiquity with great accuracy, compared them with their deſcriptions in Latin writers. The reſult of theſe obſervations was his work intitled *Roma*, containing a deſcription of that city. He afterwards ſettled at Miſenum, where he conducted a great ſchool to the time of his death in 1571. He was alſo the author of a great number of ſacred Latin poems, wrote ſeven books of the *Annals of Miſnia*, three of the *Annals of Meiſſen*, and *Travels*.

Fabricius (Jerom), a celebrated phyſician in the latter end of the 16th century (ſurnamed *Aquapendente*, from the place of his birth) was the diſciple and ſucceſſor of Fallopius. He chiefly applied himſelf to ſurgery and anatomy, which he profeſſed at Padua for forty years with extraordinary reputation. The republic of Venice ſettled a large penſion upon him, and honoured him with a gold chain and a ſtatue. He died in 1603; leaving behind him ſeveral works which are much eſteemed.

Fabricius (John Albert), one of the moſt learned and laborious men of his age, was born at Leipſic in 1668. He was choſen profeſſor of eloquence at Hamburgh in 1699, and was made doctor of divinity at Kiel. His works are numerous; and he died at Hamburgh in 1736, after a life ſpent in the ſevereſt literary application to collect and publiſh valuable remains of ancient learning.

Fabricius (Vincent), born at Hamburgh in 1613, was a good poet, a great orator, an able phyſician, and a learned civilian. He was for ſome time counſellor to the biſhop of Lubec, and afterward burgomaſter and ſyndic of the city of Dantzic; from whence he was 13 times ſent deputy into Poland, where he died at Warſaw in 1657, during the diet of that kingdom. The moſt complete edition of Fabricius's poems and other works was publiſhed at Leipſic in 1685, under the direction of his ſon Frederic Fabricius.

Fabricius (Baron), one of the fineſt gentlemen of his time, and known to the public by his letters relating to the tranſactions of Charles XII of Sweden during his reſidence in the Ottoman empire, was deſcended from a good family in Germany. He was taken early into the ſervice of the Court of Holſtein; and was ſent in a public character to the king of Sweden whilſt he was at Bender; where he ſoon acquired the good graces of that prince. He accompanied him in his exerciſes; gave him a turn for reading; and it was out of his hand Charles ſnatched Boileau's ſatires, when he tore out thoſe that repreſented Alexander the Great as a madman. Fabricius was alſo in favour with Staniſlaus, and with our king George I. whom he accompanied in his laſt journey to Hanover, and was with him when he died. A tranſlation of his letters

* See *Poetry*.

letters was publiſhed in London, 1761.

FABROT (Charles Hannibal), one of the moſt celebrated civilians of his time, was born at Aix in 1681; and acquired an extraordinary ſkill in the civil and canon law, and in the belles lettres. He publiſhed the *Baſilicæ*, or Conſtitutions of the Emperors of the Eaſt, in Greek and Latin, with learned notes, in ſeven vols folio; and editions of *Cedrenus*, *Nicetas*, *Anaſtaſius*, *Bibliothecarius*, *Conſtantine Manaſſes*, and *Cujas*, with learned and curious notes.

FABULOUS, ſomething conſiſting of, or connected with, a fable.

FABULOUS *Age*, among ancient hiſtorians. See AGE.

FACE, the ſurface, or firſt ſide which a body preſents to the eye: See SURFACE. We ſay, the *face* of the earth, of the waters, &c. Polyhedrons have ſeveral *faces*: See POLYHEDRON. A die, or cube, has ſix *faces*: See CUBE.

FACE, is particularly uſed for the viſage of an animal, and eſpecially of man; and comprehends, in the latter, all that part of the head which is not covered with the common long hair. The Latins call it *facies*, *vultus*, *os*, &c.

The human face is called the *image of the ſoul*, as being the ſeat of the principal organs of ſenſe; and the place where the ideas, emotions, &c. of the ſoul are chiefly ſet to view. Pride and diſdain are ſhewn in the eye-brows, modeſty on the cheeks, majeſty in the forehead, &c. It is the face ſhews the ſex, age, temperament, health, or diſeaſe, &c.

The face, conſidered as the index of the paſſions, habits, &c. of the perſon, makes the ſubject of phyſiognomy. See PHYSIOGNOMY and METOPOSCOPY.

Anatomiſts uſually divide the face into two parts, the upper and lower: The upper is the front, or forehead; the lower includes the eyes, noſe, ears, mouth, and chin. See ANATOMY, n° 17, &c. 366. 404. 405. 406.

Foul or *Pimpled* FACE. See GUTTA *Roſacea*.

Hippocratic FACE, is when the noſe is ſharp, the eyes hollow, the temples ſunk, the ears cold and contracted, and their lobes inverted; the ſkin about the forehead is hard, tenſe, and dry; the countenance is pale, greeniſh, or blackiſh. Some call this a cadaverous face. If it appears within three days after the onſet of an acute diſeaſe, it indicates death.

FACE, in the military art, a word of command, intimating to turn about: thus, *face to the right*, is to turn upon the left heel a quarter-round to the right; and, *face to the left*, is to turn upon the right heel a quarter-round to the left.

FACET, or FACETTE, among jewellers, is the name of the little faces or planes to be found in brilliant and roſe diamonds.

FACIES HIPPOCRATICA. See *Hippocratic* FACE.

FACIES *Rubra*, red, fiery, or foul face. See GUTTA *Roſacea*.

FACTION, a cabal or party formed in a ſtate, city, or company.

FACTION, in antiquity, a name given to the different companies of combatants in the circus. They were four, *viz.* the white, the red, the green, and the blue; to which Domitian added another of purple colour. They were ſo denominated from the colour of the liveries they wore; and were dedicated, according to M. Aur. Caſſiodorus, to the four ſeaſons of the year; the green being conſecrated to ſpring, the blue to winter, the red to ſummer, and the white to autumn. It appears from ancient inſcriptions, that each faction had its procurators and phyſician; and from hiſtory, that party-rage ran ſo high among them, that in a diſſenſion between two factions, in the time of Juſtinian, almoſt 40,000 men loſt their lives in the quarrel.

FACTITIOUS, any thing made by art, in oppoſition to what is the produce of nature. Thus, factitious cinnabar is oppoſed to native cinnabar.

FACTOR, in commerce, is an agent employed by merchants reſiding at other places, to buy or ſell goods, or negotiate bills, or tranſact any kind of buſineſs on their account; and entitled to a certain allowance for his trouble.

A ſupercargo differs from a factor in this. The buſineſs of the former is limited to the care of a particular cargo; he goes along with it, and generally returns when his buſineſs is completed: the latter has a fixed reſidence abroad, and executes buſineſs for different merchants. But their duties, and the circumſtances for which they are accountable, are the ſame.

The duty of a factor is to procure the beſt intelligence of the ſtate of trade at his place of reſidence; of the courſe of exchange; of the quantity and quality of goods at market, their preſent price, and the probability that it may riſe or fall; to pay exact obedience to the orders of his employers; to conſult their advantage in matters referred to his direction; to execute their buſineſs with all the diſpatch that circumſtances admit; to be early in his intelligence, diſtinct in his accounts, and punctual in his correſpondence.

A factor's power is either abſolute or limited. Tho' intruſted with ample diſcretionary powers, he is not warranted to take unreaſonable or unuſual meaſures, or do any thing contrary to his employer's intereſt; but it is incumbent on the employer, if he challenge his proceedings, to prove that he could have done better, and was guilty of wilful miſmanagement.

When a factor's power is limited, he muſt adhere ſtrictly to his orders. If he exceeds his power, though with a view to his employer's intereſt, he is liable for the conſequence. For example, if he gives credit when not empowered, or longer credit if not empowered, for the ſake of a better price, and the buyer proves inſolvent, he is liable for the debt. A factor has no power to give credit, unleſs authoriſed: But, if the goods conſigned be generally ſold on credit at the place of conſignation, the factor will be vindicated for ſelling at the uſual credit, unleſs expreſsly reſtricted.

Although opinion will never juſtify the factor for departing from orders, neceſſity ſometimes will. If he be limited not to ſell goods under a certain price, and the goods be periſhable, and not in a ſituation for being kept, he may ſell them, to prevent their deſtruction, even under the price limited.

A factor is never warranted to deal on truſt, except with perſons in good credit at the time. If the employer challenge the debtors, it is incumbent on him to prove that their bad circumſtances was known at the time of ſale; and the factor will be vindicated, if he truſted them at the ſame time for goods of his own.

If the factor ſells his employer's goods on truſt, and, after the day of payment is elapſed, receive payment from the purchaſer for a debt of his own, he becomes liable in equity for the debt.

In caſe of bankruptcy, the factor ought immediately to lay attachments, and adviſe his employers; and he cannot withdraw his attachments, nor compound debts, without orders.

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FAGUS, the beech-tree, a genus of the polyandria order, belonging to the monoecia claſs of plants. There are three ſpecies. 1. The ſylvaticus, or beech-tree, riſes 60 or 70 feet high, and hath a proportionable thickneſs, branching upward into a fine regular head, garniſhed with oval ſerrated leaves, with flowers in globular catkins, ſucceeded by angular fruit called *maſt*. 2. The caſtanea, or cheſtnut-tree, hath a large upright trunk growing 40 or 50 feet high, branching regularly round into a fine ſpreading head, garniſhed with large ſpear-ſhaped acutely ſerrated leaves naked on the under ſide, having flowers in long amentums, ſucceeded by round prickly fruit, containing two or more nuts. 3. The pumila, dwarf cheſtnut-tree, or chinkapin, riſes eight or ten feet high, with a branching ſhrubby ſtem, and oval, ſpear-ſhaped, and acutely ſerrated leaves, hoary on the under ſide.

Culture. The firſt is very eaſily raiſed from the maſt or ſeed, which ripens in September, and may either be ſown then, or in a month or two after, or towards the ſpring. For this purpoſe, beds are to be prepared four feet wide. The earth is then to be raked evenly from the ſurface, about an inch deep; then ſow the maſt, and beat it gently down with the back of the ſpade, afterwards covering it up with earth to the abovementioned depth. Many of the plants will come up in the ſpring, but others not till a year after; and when they are two years old, they muſt be planted out in nurſery-rows two feet and a half aſunder, there to remain till they are four or five feet high, when they are to be tranſplanted to thoſe places where they are to continue.—The ſecond and third ſorts are alſo propagated by ſeeds or nuts ſown in drills. The nuts ſometimes ripen perfectly in this country; but in default of this, there are vaſt quantities imported from Spain or Portugal. Theſe laſt are reckoned preferable even to the beſt ripened cheſtnuts of this country.

Properties. The firſt ſpecies ſpreads its branches very wide, and affords a grateful ſhade; but no verdure will thrive under it. The maſt, or ſeeds, yield a good oil for lamps; and are a very agreeable food to ſquirrels, mice, and ſwine. The fat of ſwine fed with them, however, is ſoft, and boils away unleſs hardened by ſome other food. The wood is brittle; very fiſſile; durable in water, but not in the open air: it is the beſt of all woods for fuel, and is ſometimes uſed by the wheelwright and turner to make axes, ſpokes, bowls, &c. Sword ſcabbards are alſo made of it, and ſhoemakers laſts, and formerly book-binders uſed it in making covers for books. The leaves gathered in autumn, before they are much injured by the froſts, make much better matraſſes than ſtraw or chaff; and laſt for ſeven or eight years. The nuts, when eaten by the human ſpecies, occaſion giddineſs and headach; but when well dried and powdered, they make wholeſome bread. They are ſometimes roaſted, and ſubſtituted for coffee. The poor people in Sileſia uſe the expreſſed oil inſtead of butter. The cheſtnut tree ſometimes grows to an immenſe ſize. The largeſt in the known world are thoſe which grow upon Mount Ætna in Sicily *. At Tortworth in Gloceſterſhire, is a cheſtnut tree 52 feet round. It is proved to have ſtood there ever ſince the year 1150, and was then ſo remarkable that it was called the *great cheſtnut of Tortworth*. It fixes the boundary of the manor, and is probably near 1000 years old. The wood of the cheſtnut tree is applicable to the ſame purpoſes with the oak. If the bark is not taken off, it makes poles for eſpaliers, dead fences, and hop-yards; and pipes to convey water under ground, which will laſt longer than elm or oak. Some of the oldeſt buildings in London are ſaid to be conſtructed with this wood. The nuts are uſed for whitening linen cloth, and for making ſtarch.

* See *Ætna*.

FAINT-ACTION, in law, a feigned action, or ſuch as, although the words of the writ are true, yet, for certain cauſes, the plaintiff has no title to recover thereby.

FAINT-*Pleader*, in law, a covinous, falſe, or colluſory manner of pleading, to the deceit of a third perſon.

FAINTING. See (the *Index* ſubjoined to) MEDICINE.

FAINTS, in the diſtillery, the weak ſpirituous liquor that runs from the ſtill in rectifying the low wines after the proof-ſpirit is taken off.

FAINTS, is alſo the laſt runnings of all ſpirits diſtilled by the alembic. The clearing the worm of theſe is ſo eſſential a point in order to the obtaining a pure ſpirit by the ſubſequent diſtillation, that all others are fruitleſs without it.

FAIR, a greater kind of market, granted to a town, by privilege, for the more ſpeedy and commodious providing of ſuch things as the place ſtands in need of.

The word *fair*, is formed from the French *foire*, which ſignifies the ſame thing: and *foire* is by ſome derived from the Latin *forum*, "market;" by others from the Latin *feriæ*, becauſe anciently fairs were always held in the places where the wakes, or feaſts of the dedications of churches, called *feriæ*, were held*.

* See *Feriæ*.

It is incident to a fair, that perſons ſhall be free from being arreſted in it for any other debt or contract than what was contracted in the ſame; or, at leaſt, promiſed to be paid there. Theſe fairs are generally kept once or twice a-year; and, by ſtatute, they ſhall not be held longer than they ought, by the lords thereof, on pain of their being ſeized into the king's hands, &c. Alſo proclamation is to be made, how long they are to continue; and no perſon ſhall ſell any goods after the time of the fair is ended, on forfeiture of double the value, one fourth to the proſecutor, and the reſt to the king. There is a toll uſually paid in fairs on the ſale of things, and for ſtallage, picage, &c. See the article TOLL.

Fairs abroad are either free, or charged with toll and impoſition. The privileges of free fairs conſiſt chiefly, firſt, in that all traders, &c. whether natives or foreigners, are allowed to enter the kingdom, and are under the royal protection, exempt from duties, impoſitions, tolls, &c. Secondly, that merchants, in going or returning, cannot be moleſted or arreſted, or their goods ſtopped. They are eſtabliſhed by letters-patent from the prince. Fairs, particularly free fairs, make a very conſiderable article in the commerce of Europe, eſpecially that of the Mediterranean, and inland parts of Germany, &c.

The moſt celebrated fairs in Europe are thoſe, 1. Of Francfort, held twice a-year, in ſpring and autumn: the firſt commencing the Sunday before Palm-Sunday, and the other on the Sunday before the eighth of September. Each laſts 14 days, or two weeks; the firſt of which is called the *week of acceptance*, and the ſecond the *week of payment*. They are famous for the ſale of all kinds of commodities; but particularly for the immenſe quantity of curious books no where elſe to be found, and whence the bookſellers throughout all Europe uſed to furniſh themſelves. Before each fair, there is a catalogue of all the books to be ſold thereat, printed and diſperſed, to call together purchaſers: though the learned complain of divers unfair practices therein; as fictitious titles, names of books purely imaginary, &c. beſide great faults in the names of the authors, and the titles of the real books. —2. The fairs of Leipſick, which are held thrice a-year: one beginning on the firſt of January; another three weeks after Eaſter; and a third after Michaelmas. They hold 12 days a piece; and are at leaſt as conſiderable as thoſe of Francfort. 3. The fairs of Novi, a little city in the Milaneſe, under the dominion of the Republic of Genoa. There are four in the year, commencing on the ſecond of February, the ſecond of May, the firſt of Auguſt, and ſecond of September. Though the commodities bought and ſold here be very conſiderable; yet, what chiefly contributes to render them ſo famous, is the vaſt concourſe of the moſt conſiderable merchants and negociants of the neighbouring kingdoms, for the tranſacting of affairs, and ſettling accounts. 4. The fairs of Riga, whereof there are two in the year; one in May, and the other in September. They are much frequented by the Engliſh, Dutch, and French ſhips, as alſo from all parts of the Baltic. The beſt time for the ſale of goods at Riga, is during the fairs. Since the building of the famous city of Peterſburg, theſe fairs have ſuffered ſome diminution. 5. Fair of Archangel, during which all the trade foreigners have with that city is managed. It holds a month, or ſix weeks at moſt, commencing from the middle of Auguſt. The Muſcovite merchants attend here from all parts of that vaſt empire; and the Engliſh, Dutch, French, Swediſh, Daniſh, and other ſhips in the port of that city, on this occaſion, ordinarily amount to 300. But this is no free fair, as the reſt are: The duties of exportation and importation are very ſtrictly paid, and on a very high footing. 6. The fair of St Germain, one of the ſuburbs of Paris, commencing on the third of February, and holding till Eaſter; though it is only free for the firſt 15 days. 7. The fairs of Lyons, which Monſ. du Cheſne, in his antiquity of cities, would inſinuate, from a paſſage in Strabo, were eſtabliſhed by the Romans: though it is certain, the fairs, as they now ſtand, are of a much later date. There are three in the year, each laſting 20 days, and free for ever. They begin on Eaſter Monday, the 26th of July, and the firſt of December. 8. Fair of Guibray, a ſuburb of the city of Falaiſe, in the Lower Normandy. It is ſaid to have been eſtabliſhed by our William the Conqueror, in conſideration of his being born at Falaiſe. It commences on the 16th of Auguſt; and holds 15 days free by charter, and longer by cuſtom. 9. Fair of Beaucaire, held partly in a city of that name, in Languedoc, and partly in the open country, under tents, &c. It commences on the 22d of July, and only holds for three days; yet it is the greateſt and moſt celebrated of all the fairs in that part of Europe, both for the concourſe of ſtrangers from all parts of the world, and for the traffic of all kind of goods: the money returned in theſe three days amounting ſometimes to above ſix millions of livres.

The fairs of Porto-bello, Vera Crux, and the Havana, are the moſt conſiderable of all thoſe in America. The two firſt laſt as long as the flota and gallions continue in thoſe parts; and the laſt is opened as ſoon as the flota or gallions arrive there upon their return for Spain; this being the place where the two fleets join. See Flota, and Gallions.

The principal Britiſh fairs are, 1. Sturbridge-fair, near Cambridge, by far the greateſt in Britain, and perhaps in the world. 2. Briſtol has two fairs, very near as great as that of Sturbridge. 3. Exeter. 4. Weſt Cheſter. 5. Edinburgh. 6. Wheyhill; and, 7. Burford-fair; both for ſheep. 8. Pancras fair, in Staffordſhire, for ſaddle-horſes. 9. Bartholomew fair, at London, for lean and Welch black cattle. 10. St Faith's, in Norfolk, for Scotch runts. 11. Yarmouth fiſhing-fair for herrings, the only fiſhing fair in Great Britain. 12. Ipſwich butter-fair. 13. Woodborough-hill, in Dorſetſhire, for weſt-country manufactures, as kerſeys, druggits, &c. 14. Two cheeſe fairs at Chipping Norton: with innumerable other fairs, beſides weekly markets, for all ſorts of goods, as well our own as of foreign growth.

Fair (Iſle), a ſmall iſland lying between Orkney and Shetland, twelve or ten leagues E. N. E. from the former; and ſeven, eight, or ten leagues, S. W. from the latter. It is three miles long, and ſcarce half a mile broad, very craggy, with three high rocks which are viſible both from Orkney and Shetland. There is in this iſland a ſmall quantity of arable land, which is very fruitful and well manured; and there might be conſiderably more, but the inhabitants are obliged to reſerve it for peat and paſturage. They have for the ſize of the iſland a great many ſheep, and thoſe very good and fat: but they have no kind of moorfowl or other game; but there is great plenty of ſea and water fowl, and all kinds of fiſh upon their coaſts. There is in effect no port, though they have two that are nominally ſo: one at the ſouth end, which is full of rocks, where only ſmall boats can lie, and that but indifferently; the other at the north-eaſt end, larger and ſafer in ſummer, ſo that it ſerves commodiouſly enough for their fiſhery. The duke of Medina Sidonia, when commander of the famous Spaniſh armada in 1588, was wrecked on the eaſt coaſt of this iſland. The ſhip broke to pieces, but the duke and 200 men made their eſcape. They lived here ſo long, that both they and the inhabitants were almoſt famiſhed. At length the duke and the poor remains of his people were carried over to the main land of Shetland, and then to Dunkirk, by one Andrew Humphry, for which ſervice Andrew was rewarded with 3000 merks. This iſland produced to its fomer proprietor between 50 l. and 60 l. Sterling. It was ſold at Edinburgh on the 20th of June 1766, for about 850 l. to James Stewart of Burgh, Eſq.

FAIRFAX (Edward), natural ſon of Sir Thomas Fairfax, was an Engliſh poet who lived in the reigns of Elizabeth and James I. and dedicated a tranſlation of *Taſſo* to the former. The laſt account we have of him is in the year 1631, but the time of his death is uncertain. He wrote ſeveral poetical pieces, and was an accompliſhed genius. Dryden introduces Fairfax with Spencer, as the leading writers of the times; and even ſeems to give the preference to the former in the way of harmony, when he obſerves that Waller owned himſelf indebted for the harmony of his numbers to Fairfax's *Godfrey of Boulogne*.

Fairfax (Sir Thomas), general of the parliamentary forces againſt Charles I. in 1644. See (*Hiſtory of*) Britain n° 127 *et ſeq.* He reſigned in 1650; after which he lived privately, till he was invited by general Monk to aſſiſt him againſt Lambert's army. He cheerfully embraced the occaſion; and, on the third of December 1659, appeared at the head of a body of gentlemen of Yorkſhire; when, upon the reputation of his name, a body of 12,000 men forſook Lambert and joined him. He was at the head of the committee appointed by the Houſe of Commons to attend king Charles II. at the Hague, to deſire him ſpeedily to return to England; and having readily aſſiſted in his reſtoration, returned again to his ſeat in the country; where he lived in a private manner, till his death, which happened in 1671, in the 60th year of his age.—He wrote, ſays Mr Walpole, memorials of Thomas lord Fairfax, printed in 1699; and was not only an hiſtorian, but a poet. In Mr Thoreſby's muſeum were preſerved in manuſcript the following pieces: The Pſalms of David, the Canticles, the ſongs of Moſes, and other parts of Scripture, verſified; a poem on Solitude; Notes of ſermons by his lordſhip, by his lady daughter of Horace lord Vere, and by their daughter Mary the wife of George ſecond duke of Buckingham; and a treatiſe on the ſhortneſs of life. But of all lord Fairfax's works, ſays Mr Walpole, the moſt remarkable were the verſes he wrote on the horſe on which Charles II. rode to his coronation; and which had been bred and preſented to the king by his lordſhip. How muſt that merry monarch, unapt to keep his countenance on more ſerious occaſions, have ſmiled at this aukward homage from the old victorious hero of republicaniſm and the covenant! He gave a collection of manuſcripts to the Bodleian library.

FAIRFORD, a town in Glouceſterſhire, with a market on Thurſdays. It is remarkable for the church, which has curious painted glaſs-windows. They are ſaid to have been taken in a ſhip by John Tame, Eſq. towards the end of the 15th century, who built the church for their ſake. They are preſerved entire, and the figures are extremely well drawn and coloured. They repreſent the moſt remarkable hiſtories in the Old and New Teſtament. They are frequently viſited by travellers, and many go on purpoſe to view them, as one of the greateſt curioſities in England. The painter was Albert Durer. W. Long. 1. 46. N. Lat. 51. 42.

FAIRY, in ancient traditions and romances, ſignifies a ſort of deity, or imaginary genius, converſant on the earth, and diſtinguiſhed by a variety of fantaſtical actions either good or bad.

They were moſt uſually imagined to be women of an order ſuperior to human nature, yet ſubject to wants, paſſions, accidents, and even death; ſprightly and benevolent while young and handſome; moroſe, peeviſh, and malignant, if ugly, or in the decline of their beauty; fond of appearing in white, whence they are often called the *white ladies*.

Concerning theſe imaginary beings, no leſs a perſon than Jervaiſe of Tilleberry, marſhal of the kingdom of Arles, who lived in the beginning of the 13th century, writes thus in a work inſcribed to the emperor Otho IV. "It has been aſſerted by perſons of unexceptionable credit, that fairies uſed to chooſe themſelves gallants from among men, and rewarded their attachment with an affluence of worldly goods; but if they married, or boaſted of a fairy's favours, they as ſeverely ſmarted for ſuch indiſcretion." The like tales ſtill go current in Languedoc; and, throughout the whole province, there is not village without ſome ancient ſeat or cavern which had the honour of being a fairy's reſidence, or at leaſt ſome ſpring where a fairy uſed to bathe. This idea of fairies has a near affinity with that of the Greeks and Romans, concerning the nymphs of the woods, mountains, and ſprings; and an ancient ſcholiaſt on Theocritus ſays, "The nymphs are demons which appear on the mountains in the figure of women:" and what is more ſurpriſing, the Arabs and other orientals have their *ginn* and *peri*, of whom they entertain the like notions.

But fairies have been likewiſe deſcribed as of either ſex, and generally as of minute ſtature, though capable of aſſuming various forms and dimenſions. The moſt charming repreſentation imaginable of theſe children of romantic fancy, is in the *Midſummer-night's Dream* of Shakeſpear; in referring to which, we will no doubt have been anticipated by the recollection of almoſt every reader.

Spenſer's Fairy Queen is an epic poem, under the perſons and characters of fairies. This ſort of poetry raiſes a pleaſing kind of horror in the mind of the reader, and amuſes his imagination with the ſtrangeneſs and novelty of the perſons who are repreſented in it; but, as a vehicle of inſtruction, the judicious object to it, as not having probability enough to make any moral impreſſion.

The belief of fairies ſtill ſubſiſts in many parts of our own country. The

"Swart fairy of the mine,"

(of German extraction), has ſcarce yet quitted our ſubterraneous works; (*vid.* next article.) *Puck*, or *Robin Good-Fellow*, ſtills haunts many of our villages. And in the Highlands of Scotland, new-born children are watched till the chriſtening is over, leſt they ſhould be ſtolen or changed by ſome of theſe phantaſtical exiſtences.

FAIRY *of the Mine*; an imaginary being, an inhabitant of mines. The Germans believed in two ſpecies; one fierce and malevolent; the other a gentle race, appearing like little old men dreſſed like the miners, and not much above two feet high. Theſe wander about the drifts and chambers of the works; ſeem perpetually employed, yet do nothing; ſome ſeem to cut the ore, or fling what is cut into veſſels, or turn the windlaſs; but never do any harm to the miners, unleſs provoked; as the ſenſible Agricola, in this point credulous, relates in his book *de Animantibus Subterraneis*.

FAIRY *Circle* or *Ring*, a phenomenon pretty frequent in the fields, &c. ſuppoſed by the vulgar to be traced by the fairies in their dances. There are two kinds of it; one of about ſeven yards in diameter, containing a round bare path, a foot broad, with green graſs in the middle of it. The other is of different bigneſs, encompaſſed with a circumference of graſs. Meſſ. Jeſſop and Walker, in the Philoſophical Tranſactions, aſcribe them to lightning; which is thought to be confirmed by their being moſt frequently produced after ſtorms of that kind, as well as by the colour and brittleneſs of the graſs-roots when firſt obſerved. Lightning, like all other fires, moves round, and burns more in the extremity than in the middle: the ſecond circle ariſes from the firſt, the graſs burnt up growing very plentifully afterwards. Others maintain that theſe circles are made by ants, which are frequently found in great numbers therein.—Mr Cavallo, who hath publiſhed an eſteemed treatiſe on electricity, does not think that lightning is at all concerned in the formation of them: "They are not, (ſays he), always of a circular figure; and, as I am informed, they ſeem to be rather beds of muſhrooms, than the effects of lightning."

FAITH, in divinity and philoſophy, the firm belief of certain truths upon the teſtimony of the perſon who reveals them. See METAPHYSICS, n° 265.

The grounds of a rational faith are, 1. That the things revealed be not contrary to, though they may be above, natural reaſon. 2. That the revealer be well acquainted with the things he reveals. 3. That he be above all ſuſpicion of deceiving us.

Where theſe criterions are found, no reaſonable perſon will deny his aſſent: thus, we may as well doubt of our own exiſtence, as of the truth of a revelation coming from God, who can neither be deceived himſelf, nor deceive others by propoſing things to be believed that are contradictory to the faculties he has given us. Whatever propoſitions, therefore, are beyond reaſon, but not contrary to it, are, when revealed, the proper matter of faith.

FAITH, or *Fidelity*, (*Fides*), was deified by the ancient Romans, and had a temple in the Capitol conſecrated to her by Attilius Calatinus. Her prieſts wore white veils: unbloody ſacrifices were offered to her, and the greateſt oaths were taken in her name. Horace clothes her in white, places her in the retinue of Fortune, and makes her the ſiſter of Juſtice, *Od.* 24, 35. *l.* 1. Public Faith is repreſented in a great number of medals; ſometimes with a baſket of fruit in one hand, and ſome ears of corn in the other; and ſometimes holding a turtle-dove. But the moſt uſual ſymbol is two hands joined together. The inſcriptions are generally, *Fides Auguſti*, *Fides Exercitus*, or *Fides Militum*, &c.

FAITHFUL, an appellation aſſumed by the Mahometans. See MAHOMETANS.

Faithorn, Fakirs.

FAITHORN (William), an ingenious Engliſh painter of the 17th century, who, when the civil wars broke out, went into the army; but being made priſoner in Baſinghouſe, and refuſing to take the oaths to Oliver, he was baniſhed to France. He was as great a proficient in engraving as in painting; and there are many ſpecimens of his performance extant in England. He died in Blackfriars, about the beginning of king William's reign; and wrote a book *Upon Drawing, Graving, and Etching*, for which he was celebrated by his friend Thomas Flatman the poet.

FAKIRS, Indian monks or friars. They out-do the ſeverity and mortification of the ancient Anchorets or Solitaries. Some of them make a vow of continuing all their life-time in one poſture, and keep it effectually. Others never lie down; but continue in a ſtanding poſture all their lives, ſupported only by a ſtick, or rope under their arm-pits. Some mangle their bodies with ſcourges and knives. They look upon themſelves to have conquered every paſſion, and triumphed over the world; and accordingly ſcruple not, as if in a ſtate of innocence, to appear entirely naked in public.

The common people of Eaſt-India are thoroughly perſuaded of the virtue and innocence of the fakirs; notwithſtanding which, they are accuſed of committing the moſt enormous crimes in private.

They have alſo another kind of fakirs, who do not practiſe ſuch ſeverities: theſe flock together in companies, and go from village to village, propheſying, and telling fortunes. They are wicked villains, and it is dangerous for a man to meet them in a lone place: nevertheleſs the Indian idolaters have them in the utmoſt veneration. They make uſe of drums, trumpets, and other muſical inſtruments, to rouſe their ſouls, and work themſelves up to an artificial ecſtaſy, the better to publiſh their pretended prophecies.

Some of the votaries of theſe ſages moſt devoutly kiſs their privy-parts; and they receive this monſtrous declaration of reſpect with a kind of ecſtatic pleaſure. The moſt ſober and diſcreet Indians conſult them in this prepoſterous attitude; and their female votaries converſe with them a conſiderable time, with the moſt indecent freedom.

The fire they burn is made of cow's dung, dried in the ſun. When they are diſpoſed to ſleep, they repoſe themſelves on cow's dung, and ſometimes on ordure itſelf. They are ſo indulgent towards every living creature, that they ſuffer themſelves to be over-run with vermin, or ſtung by inſects, without the leaſt reluctancy or complaint.

It is more than probable, theſe Indian friars have ſome ſecret art to lull their ſenſes aſleep, in order to render themſelves, in a great meaſure, inſenſible of the exceſſive torments they voluntarily undergo. Ovington aſſures us, that "as he was one day in an aſſembly of fakirs, he obſerved, that they drank opiates infuſed in water; the intoxicating virtue whereof was enough to turn their brain."

The garment of the chief fakirs conſiſts of three or four yards of orange-coloured linen, which they tie round them, and a tyger's ſkin, which hangs over their ſhoulders. Their hair is woven in treſſes, and forms a kind of turban. The ſuperior of the fakirs is diſtinguiſhed from the reſt by having a greater number of pieces in his garment, and by a chain of iron, two yards long, tied to his leg. When he deſigns to reſt in any place, a garment is ſpread upon the ground; on which he ſits and gives audience, whilſt his diſciples publiſh his virtues.

Falcade ‖ Falco.

Some perſons of quality in India have become fakirs: among others, five great lords belonging to the court of Cha-gehan, Mogul of the Indies. It is ſaid, there are about two millions of fakirs in the Eaſt-Indies.

FALCADE, in the menage, the motion of a horſe when he throws himſelf upon his haunches two or three times, as in very quick curvets; which is done in forming a ſtop and half ſtop. See STOP.

FALCATED, ſomething in the form of a ſickle: thus, the moon is ſaid to be *falcated* when ſhe appears horned.

Plate CIV. CV.

FALCO, in ornithology, a genus belonging to the order of accipitres, the characters of which are theſe: The beak is crooked, and furniſhed with wax at the baſe; the head is thick-ſet with feathers, and the tongue is cloven. The principal ſpecies are, *viz.*

1. The coronatus, or crowned eagle of Edwards, with aſh-coloured wax; the legs are covered with white downy feathers, interſperſed with black ſpots; the breaſt is reddiſh; and there are black belts on the ſides. It is a native of Guinea.

2. The melanæetus, or black eagle of Ray, has yellowiſh-wax on the beak; the legs are half covered with feathers; and the body is aſh-coloured and ſtreaked with yellow. It is a native of Europe.

3. The leucocephalus, or white-headed eagle of Cateſby, is aſh-coloured, with the head and tail white; the iris of the eye is white, over which is a prominence covered with a yellow ſkin; the bill and the ſear or wax are yellow, as are likewiſe the legs and feet; and the talons are black. Though it is an eagle of ſmall ſize, it weighs nine pounds, is ſtrong and full of ſpirit, preying on lambs, pigs, and fawns. They always make their neſts near the ſea, or great rivers, and uſually upon old, dead pine or cypreſs trees, continuing to build annually on the ſame tree till it falls. Though he is ſo formidable to all birds, yet he ſuffers them to build near his royal neſt without moleſtation; particularly the fiſhing hawk, herons, &c. which all build on high trees, and in ſome places are ſo near one another, that they appear like a rookery. It is a native both of Europe and America.

Sea-eagle.

4. The oſſifragus, or ſea-eagle, with yellow wax, and half-feathered legs; it is about the ſize of a peacock; the feathers are white at the baſe, iron-coloured in the middle, and black at the points; and the legs are yellow. It is found in ſeveral parts of Great Britain and Ireland. Mr Willoughby tells us, that there was an aery of them in Whinfield Park, Weſtmoreland; and the bird ſoaring in the air with a cat in its talons, (which Barlow drew from the very fact which he ſaw in Scotland), is of this kind. The cat's reſiſtance brought both animals to the ground, when Barlow took them up; and afterwards cauſed the event to be engraved in the 36th plate of his Collection of Prints. Turner ſays, that in his days this bird was too well known in England; for it made horrible deſtruction among the fiſh. All authors indeed agree, that it feeds principally on fiſh; which it takes, as they are ſwimming

ming near the ſurface, by darting itſelf down upon them; not by diving or ſwimming, as ſome authors have pretended, who furniſh it for that purpoſe with one webbed foot to ſwim with, and another divided foot to take its prey with. Martin, ſpeaking of what he calls the great eagles of the Weſtern Iſles, ſays, that they faſten their talons in the back of the fiſh, commonly of ſalmon, which are often above the water, or very near the ſurface. Thoſe of Greenland will even take a young ſeal out of the water.—Turner, above-mentioned, ſays, that the fiſhermen were fond of anointing their baits with the fat of this bird, imagining that it had a peculiar alluring quality: they were even ſuperſtitious enough to believe, that whenever the ſea-eagle hovered over a piece of water, the fiſh (as if charmed) would riſe to the ſurface with their bellies upwards; and in that manner preſent themſelves to him. It alſo preys on water-fowl.

Golden eagle.

5. The chryſaëtos, or golden eagle, weighs about 12 pounds, and is in length about three feet, the wings, when extended, meaſuring about ſeven feet four inches. The ſight and ſenſe of ſmelling are very acute: the head and neck are clothed with narrow, ſharp-pointed feathers, of a deep brown colour bordered with tawney; the hind part of the head in particular is of a bright ruſt-colour.—Theſe birds are very deſtructive to fawns, lambs, kids, and all kinds of game; particularly in the breeding ſeaſon, when they bring a vaſt quantity of prey to their young. Smith, in his hiſtory of Kerry, relates, that a poor man in that country got a comfortable ſubſiſtence for his family, during a ſummer of famine, out of an eagle's neſt, by robbing the eaglets of the food the old ones brought; whoſe attendance he protracted beyond the natural time, by clipping the wings and retarding the flight of the former. It is very unſafe to leave infants in places where eagles frequent; there being inſtances in Scotland of two being carried off by them; but, fortunately, the theft was diſcovered in time, and the children were reſtored unhurt out of the eagles neſts. In order to extirpate theſe pernicious birds, there is a law in the Orkney iſles, which entitles every perſon that kills an eagle to a hen out of every houſe in the pariſh where it was killed.—Eagles ſeem to give the preference to the carcaſes of dogs and cats. People who make it their buſineſs to kill thoſe birds, lay one or other of theſe carcaſes by way of bait; and then conceal themſelves within gunſhot. They fire the inſtant the eagle alights; for ſhe, that moment, looks about before ſhe begins to prey. Yet, quick as her ſight may be, her ſenſe of hearing ſeems ſtill more exquiſite. If hooded crows or ravens happen to be nearer the carrion, and reſort to it firſt, and give a ſingle croak, the eagle is certain of inſtantly repairing to the ſpot.

Eagles are remarkable for their longevity, and for their power of ſuſtaining a long abſtinence from food. Mr Keyſler relates, that an eagle died at Vienna after a confinement of 104 years. This pre-eminent length of days probably gave occaſion to the ſaying of the Pſalmiſt, "Thy youth is renewed like the eagle's." One of this ſpecies, which was nine years in the poſſeſſion of Owen Holland, Eſq. of Conway, lived 32 years with the gentleman who made him a preſent of it; but what its age was when the latter received it from Ireland, is unknown. The ſame bird alſo furniſhes us with a proof of the truth of the other remark; having once, through the neglect of ſervants, endured hunger for 21 days without any ſuſtenance whatever.

Black eagle.

6. The fulvus, is common to the northern parts of Europe and America; that figured by Mr Edwards differing from our ſpecies only in having ſome white ſpots on the breaſt. It is frequent in Scotland; where it is called the *black eagle*, from the dark colour of its plumage. It is very deſtructive to deer, which it will ſeize between the horns; and, by inceſſantly beating it about the eyes with its wings, ſoon makes a prey of the harraſſed animal. The eagles in the iſle of Rum have nearly extirpated the ſtags that uſed to abound there. This ſpecies generally builds in clefts of rocks near the deer-foreſts; and makes great havock not only among them, but alſo among the white hares and ptarmigans. It is of equal ſize with the preceding, and is eaſily diſtinguiſhed from all the other ſpecies by a band of white on the upper part of the tail; the end only being of a deep brown. The legs are feathered to the feet, the toes yellow, the claws black. Mr Willoughby gives the following curious account of the neſt of this ſpecies. "In the year of our Lord 1668, in the woodlands near the river Darwent, in the peak of Derbyſhire, was found an eagle's neſt made of great ſticks, reſting one end in the edge of a rock, the other on two birch trees; upon which was a layer of ruſhes, and over them a layer of heath, and upon the heath ruſhes again: upon which lay one young one and an addle egg; and by them a lamb, a hare, and three heath-poults. The neſt was about two yards ſquare, and had no hollow in it. The young eagle was black as a hobby, of the ſhape of a goſhawk, almoſt of the weight of a gooſe, rough-footed, or feathered down to the foot: having a white ring about the tail."

7. The ruſticolus, with a yellow wax, yellow ring round the eyes, and yellow legs; the body is aſh-coloured undulated with white, and a white ring round the neck: it is a native of Sweden.

8. The barbarus, with yellow wax, and yellow legs; the body is bluiſh, and ſpotted with brown: it is a native of Barbary.

9. The cæruleſcens, with yellow wax, a yellow ring round the eyes, and the feet yellow underneath; the back is of a blackiſh blue colour; and the temples are ſurrounded with a white line. This is the ſmalleſt bird of the genus, and is a native of Aſia.

Hen-harrier.

10. The cyaneus, or hen-harrier, with white wax, yellow legs, a whitiſh blue body, and a white ring round the eyes and throat. It is the blue hawk of Edwards, and is a native of Europe and Africa. Theſe birds are extremely deſtructive to young poultry and to the feathered game: they fly near the ground, ſkimming the ſurface in ſearch of prey. They breed on the ground, and never are obſerved to ſettle on trees.

11. The albiulla, or cinereous eagle, is inferior in ſize to the golden eagle; the head and neck are of a pale aſh-colour: the body and wings cinereous, clouded with brown; the quill-feathers very dark; the tail white; the legs feathered but little below the knees, and of a very bright yellow. The male is of a darker colour than the female. The bill of this ſpecies is rather ſtraighter than is uſual in the eagle; which

Falco.

ſeems to have induced Linnæus to place it among the *vultures*. But it can have no title to be ranked with that genus: for the pygargus is wholly feathered; whereas the characteriſtical mark of the vulture is, that the head and neck are either quite bare, or only covered with down. It inhabits Scotland and the Orkneys; and feeds on fiſh, as well as on land animals.

12. The milvus, or kite, is a native of Europe, Aſia, and Africa. Bellonius relates, that, about the end of April, incredible numbers of them are ſeen flying over the Black Sea into Aſia. This ſpecies generally breeds in large foreſts, or woody mountainous countries. Its neſt is compoſed of ſticks, lined with ſeveral odd materials, ſuch as rags, bits of flannel, rope, and paper. It lays two, or at moſt three, eggs; which, like thoſe of other birds of prey, are much rounded and blunt at the ſmaller end. They are white, ſpotted with dirty yellow. Its motion in the air diſtinguiſhes it from all other birds, being ſo ſmooth and even that it is ſcarce perceptible. Sometimes it will remain quite motionleſs for a conſiderable ſpace; at others, glide through the ſky, without the leaſt apparent action of its wings; from thence deriving the old name of *glead* or *glede*, from the Saxon *glida*. The tail of this bird, as being forked, is ſufficient to diſtinguiſh it from moſt other birds of prey. The kites vary in their colours. Mr Pennant mentions a beautiful variety ſhot in Lincolnſhire, that was entirely of a tawny colour. Some have ſuppoſed them to be birds of paſſage, but in Britain they certainly continue the whole year. Lord Bacon obſerves, that when kites fly high, it portends fair and dry weather.

13. The gentilis, or gentil falcon, inhabits the north of Scotland, and was in high eſteem as a bold and ſpirited bird in the days of falconry. It makes its neſt in rocks: it is larger than the goſhawk; the head of a light ruſt colour, with oblong black ſpots; the whole under-ſide from chin to tail white, tinged with yellow; the back of a brown colour; the tail barred with four or five bars of black, and as many of aſh-colour; the very tips of all the tail-feathers white.

14. The ſubbuteo, or hobby, was uſed like the keſtrel in the humbler kind of falconry; particularly in what was called *daring of larks*: the hawk was caſt off; the larks, aware of their moſt inveterate enemy, were fixed to the ground for fear; by which means they became a ready prey to the fowler by drawing a net over them. The back of this bird is brown; the nape of the neck white; and the belly pale, with oblong brown ſpots. It is a bird of paſſage; but breeds in Britain, and migrates in October.

15. The buteo, or buzzard, is the moſt common of the hawk kind in England. It breeds in large woods; and uſually builds on an old crow's neſt, which it enlarges, and lines with wool and other ſoft materials. It lays two or three eggs, which are ſometimes perfectly white, ſometimes ſpotted with yellow. The cock buzzard will hatch and bring up the young if the hen is killed. The young keep company with the old ones for ſome little time after they quit the neſt; which is not uſual with other birds of prey, who always drive away their brood as ſoon as they can fly. This ſpecies is very ſluggiſh and inactive, and is much leſs in motion than other hawks; remaining perched on the ſame bough for the greateſt part of the day, and is found at moſt times near the ſame place. It feeds on birds, rabbits, moles, and mice; it will alſo eat frogs, earthworms, and inſects. This bird is ſubject to ſome variety in its colours. Some have their breaſt and belly of a brown colour, and are only marked croſs the craw with a large white creſcent; but uſually the breaſt is of a yellowiſh white, ſpotted with oblong ruſt-coloured ſpots, pointing downwards: the back of the head, neck, and coverts of the wings, are of a deep brown, edged with a pale ruſt-colour: the middle of the back covered only with a thick white down. The tail is barred with black, and aſh-colour, and ſometimes with ferruginous.

Falco.

Keſtrel.

16. The tinnunculus, or keſtrel, breeds in the hollows of trees, in the holes of high rocks, towers, and ruined buildings. It feeds on field-mice, ſmall birds, and inſects; which it will diſcover at a great diſtance. This is the hawk that we ſo frequently ſee in the air fixed in one place; and, as it were, fanning it with its wings; at which time it is watching for its prey. When falconry was in uſe in Great Britain, this bird was trained for catching ſmall birds and young partridges. It is eaſily diſtinguiſhed from all other hawks by its colours. The crown of the head and the greater part of the tail are of a fine light grey; the back and coverts of the wings of a brick-red, elegantly ſpotted with black: the whole under ſide of the bird, of a pale ruſt-colour ſpotted with black.

Laughing-hawk.

17. The ſufflator, with yellowiſh wax and legs; the body is of a browniſh white colour; and the covers of the eyes are bony. He has a fleſhy lobe between the noſtrils; which, when angry or terrified, he inflates till his head becomes as big as his whole body. He is a native of Surinam.

18. The cachinnans, or laughing hawk, has yellowiſh legs and wax, and white eye-brows; the body is variegated with brown and white; and it has a black ring round the top of the head. It makes a laughing kind of noiſe when it obſerves any perſon, and is a native of America.

Pigeon-hawk.

19. The columbarius, or pigeon-hawk of Cateſby, weighs about ſix ounces. The bill is black at the point, and whitiſh at the baſe; the iris of the eye is yellow; the baſe of the upper mandible is covered with a yellow cere or wax; all the upper part of the body, wings, and tail, are brown. The interior vanes of the quill-feathers have large red ſpots. The tail is marked with large regular tranſverſe white lines; the throat, breaſt, and belly, are white, mixed with brown; the ſmall feathers that cover the thighs reach within half an inch of the feet, and are white, with a tincture of red, beſet with long ſpots of brown; the legs and feet are yellow. It is a very ſwift and bold hawk, preying on pigeons, young turkeys, &c. and is a native of Carolina.

20. The veſpertinus, is about the ſize of a pigeon; the body is of a blueiſh brown colour; and the bill is yellow, and brown at the point. It is a native of Ingria, and flies both in the day and in the night.

21. The furcatus, or ſwallow-tailed hawk, weighs about 14 ounces; the bill is black; the eyes are large and black, with a red iris; the head, neck, breaſt, and belly, are white; the upper part of the back and wings a dark purple; but more duſky towards the lower

parts, with a tincture of green. The wings are long in proportion to the body, and, when extended, meaſure four feet. The tail is dark purple mixed with green, and remarkably forked. Like ſwallows, they continue long on the wing; catching, as they fly, beetles, flies, and other inſects. They are ſaid to prey upon lizards and ſerpents, and are found in America.

Fiſhing-hawk, or oſprey.

22. Haliætus, the fiſhing-hawk of Cateſby, or the oſpray, weighs three pounds and a quarter; it meaſures, from one end of the wing to the other, five feet and a half. The bill is black, with a blue cere or wax; the iris of the eye is yellow, and the crown of the head brown, with a mixture of white feathers; from each eye, backwards, runs a brown ſtripe: the back, wings, and tail, are of a dark brown; the throat, neck, and belly, white; the legs and feet are rough and ſcaly, and of a pale blue colour; the talons are black, and nearly of an equal ſize; the feathers of the thighs are ſhort, and adhere cloſe to them, contrary to others of the hawk kind, which nature ſeems to have deſigned for the more eaſily penetrating the water. Their manner of fiſhing is, after hovering a while over the water, to precipitate into it with prodigious ſwiftneſs; where they remain for ſome minutes, and ſeldom riſe without a fiſh. The white-headed eagle, who is generally on the watch, no ſooner ſpies him with his fiſh, than he flies furiouſly upon him: the hawk immediately mounts, and ſcreams out; but the eagle always ſoars above him, and compels him to let the fiſh fall: the eagle inſtantly darts down upon the fiſh, and ſeldom fails to catch it before it reaches the water. It is remarkable, that, whenever the hawk catches a fiſh, he calls out, as if it were to give warning to his enemy the eagle, who always obeys the call, if within hearing. The lower parts of the rivers and creeks near the ſea in America, abound with theſe eagles and hawks, where ſuch diverting conteſts are often ſeen.

Gyrfalcon.

23. The gyrfalco, or gyrfalcon, with blue wax on the beak, yellow legs, a brown body marked with aſh-coloured ſtreaks underneath, and the ſides of the tail white. It is the gyrfalco of all the ornithologiſts except Linnæus, whoſe bird is unknown to the reſt. It is a native of Europe; and feeds upon cranes, pigeons, &c.

Honey-buzzard.

24. The aviporus, with black wax, yellow legs, half naked, the head of an aſh colour, and having an aſh-coloured ſtripe on the tail which is white at the end. It is the honey-buzzard of Ray, and had its name from the combs of waſps being found in its neſt. It is a native of Europe, and feeds on mice, lizards, frogs, bees, &c. It runs very ſwiftly, like a hen.

Moor-buzzard.

25. The æruginoſus, or moor-buzzard, with greeniſh wax, a greyiſh body, the top of the head, nape of the neck, and legs, yellowiſh; is a native of Europe, and frequents moors, marſhy places, and heaths: it never ſoars like other hawks; but commonly ſits on the ground, or on ſmall buſhes. It makes its neſt in the midſt of a tuft of graſs or ruſhes. It is a very fierce and voracious bird; and is a great deſtroyer of rabbits, young wild-ducks, and other water-fowl. It preys, like the oſprey, on fiſh.

26. The palumbarius, with black wax edged with yellow; yellow legs, a brown body, and the prime feathers of the tail marked with pale ſtreaks, and the eye-brows white. It is the goſhawk of Ray; and was formerly in high eſteem among falconers, being flown at cranes, geeſe, pheaſants, and partridges. It breeds in Scotland, and builds its neſt in trees; is very deſtructive to game, and daſhes thro' the woods after its quarry with vaſt impetuoſity; but if it cannot catch the object of its purſuit almoſt immediately, deſiſts, and perches on a bough till ſome new game preſents itſelf.

Goſhawk.

Sparrow-hawk.

27. The niſus, or ſparrow-hawk, with green wax, yellow legs, a white belly undulated with grey, and the tail marked with blackiſh belts. This is the moſt pernicious hawk we have; and makes great havock among pigeons as well as patridges. It builds in hollow trees, in old neſts of crows, large ruins, and high rocks: it lays four white eggs, encircled near the blunter end with red ſpecks.

28. The minutus, with white wax, yellow legs, and the body white underneath. It is the leaſt hawk of Briſſonius, being about the ſize of a thruſh; and is found on the iſland Melita.

FALCON, or **FAUCON**, a bird of prey of the hawk kind, ſuperior to all others for courage, docility, gentleneſs, and nobleneſs of nature *. Several authors take the name *falcon* to have been occaſioned by its crooked talons or pounces, which reſemble a falx or ſickle. Giraldus derives it *a falcando*, becauſe it flies in a curve.

The falcon, or falcon gentle, is both for the fiſt and for the lure. In the choice, take one that has wide noſtrils, high and large eye-lids, a large black eye; a round head, ſomewhat full on the top; barb feathers on the clap of the beaks, which ſhonld be ſhort, thick, and of an azure colour; the breaſt large, round, and fleſhy; and the thighs, legs, and feet, large and ſtrong; with the ſear of the foot ſoft and bluiſh: the pounces ſhould be black, with wings long and croſſing the train, which ſhould be ſhort and very pliable.

The name *falcon* is reſtrained to the female: for the male is much ſmaller, weaker, and leſs courageous, than the female; and therefore is denominated *taſſel*, or *tircelet*. The falcon is excellent at the river, brook, and even field; and flies chiefly at the lager game, as wild-gooſe, kite, crow, heron, crane, pye, ſhoveler, &c. For further particulars, ſee FALCONRY, HAWK, and HAWKING.

FALCONER, a perſon who brings up, tames, and makes, that is, tutors and manages, birds of prey; as falcons, hawks, &c. See FALCONRY.

The grand ſeignior uſually keeps 6000 falconers in his ſervice.—The French king has a grand falconer, which is an office diſmembered from that of great hunt, *grand venur*. Hiſtorians take notice of this poſt as early as the year 1250.

A falconer ſhould be well acquainted with the quality and mettle of his hawks, that he may know which of them to fly early, and which late. Every night after flying he ſhould give them caſting; one while plumage, ſometimes pellets of cotton, and at another time phyſic, as he finds neceſſary. He ought alſo every evening to make the place clean under the porch, that by her caſting he may know whether ſhe wants ſcouring upwards or downwards. Nor muſt he forget to water his hawk every evening, except on ſuch days as ſhe has bathed; after which, at night, ſhe ſhould

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* See Fal

Plate CIV.

Fig. 1.
FALCO LEUCOCEPHALUS
or
WHITE HEADED EAGLE

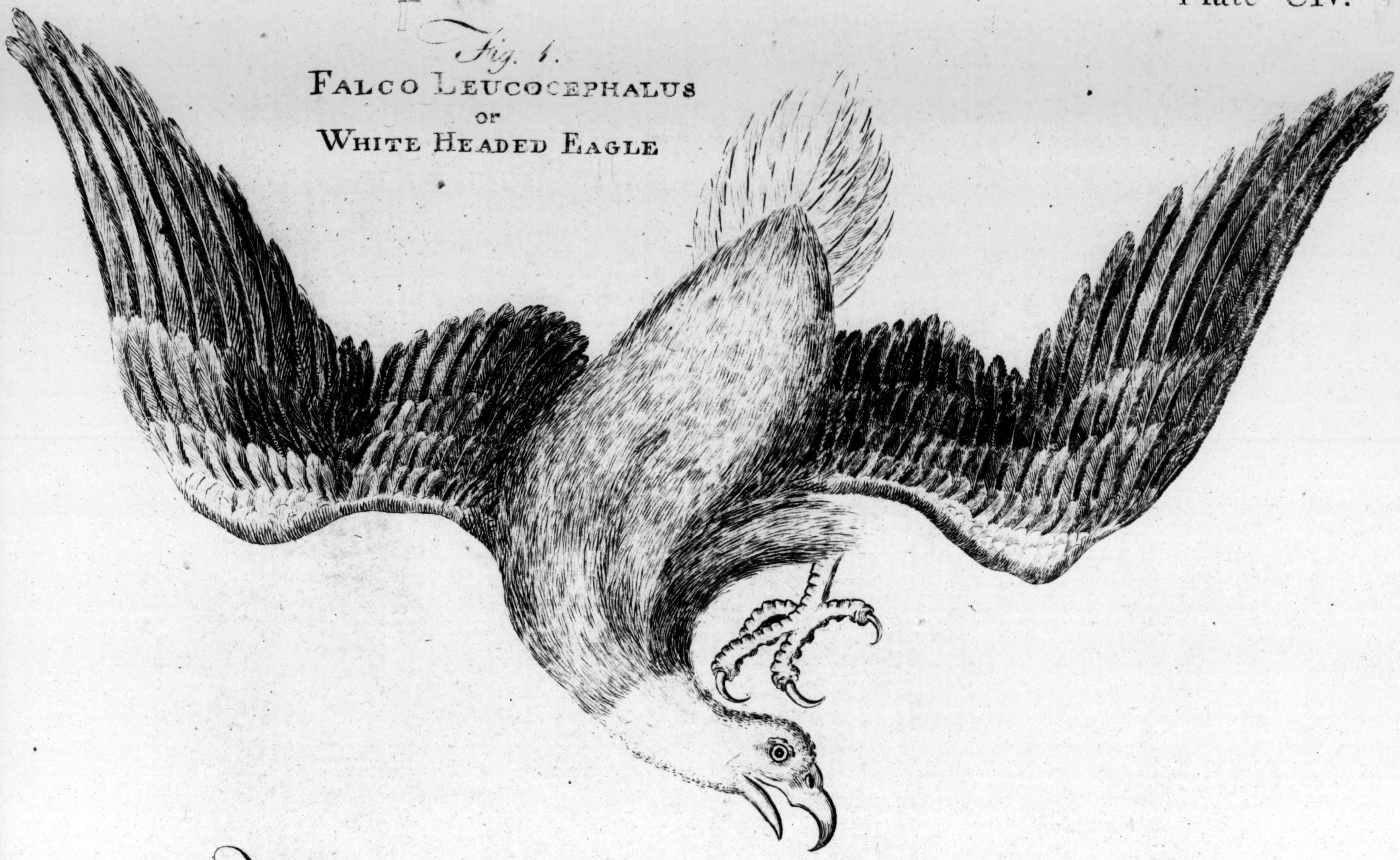


Fig. 2.
FALCO FURCATUS
or
SWALLOW TAILD HAWK

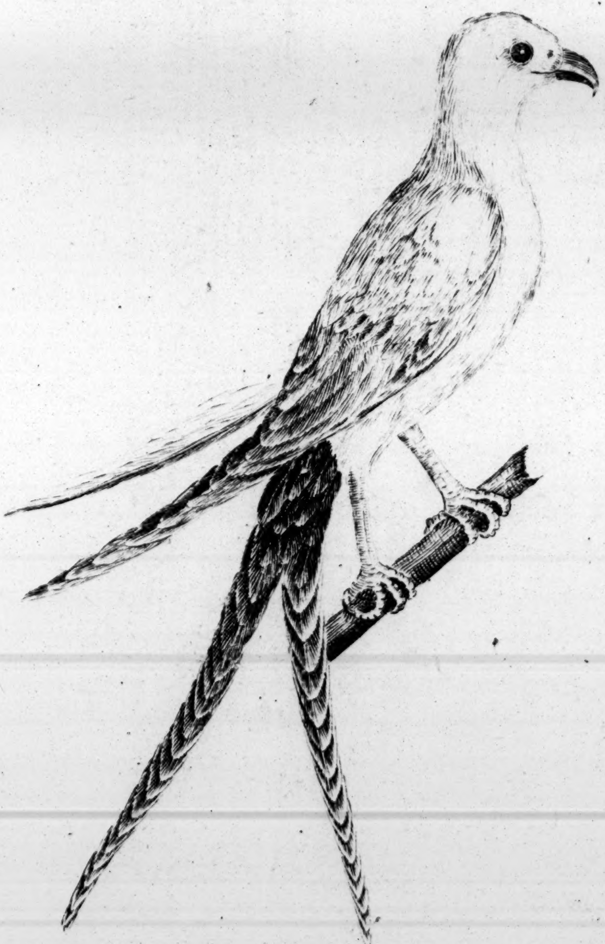
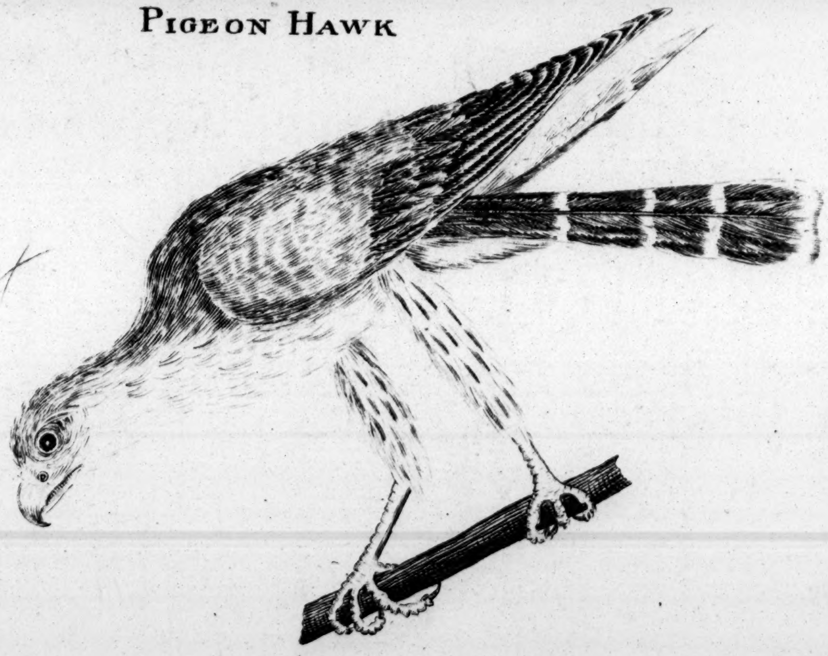


Fig. 3.
FALCO COLUMBARIUS
or
PIGEON HAWK



A. Bell sculpt.

3 MA 53

Fig. 1. Felis Pardus *or*
Panther

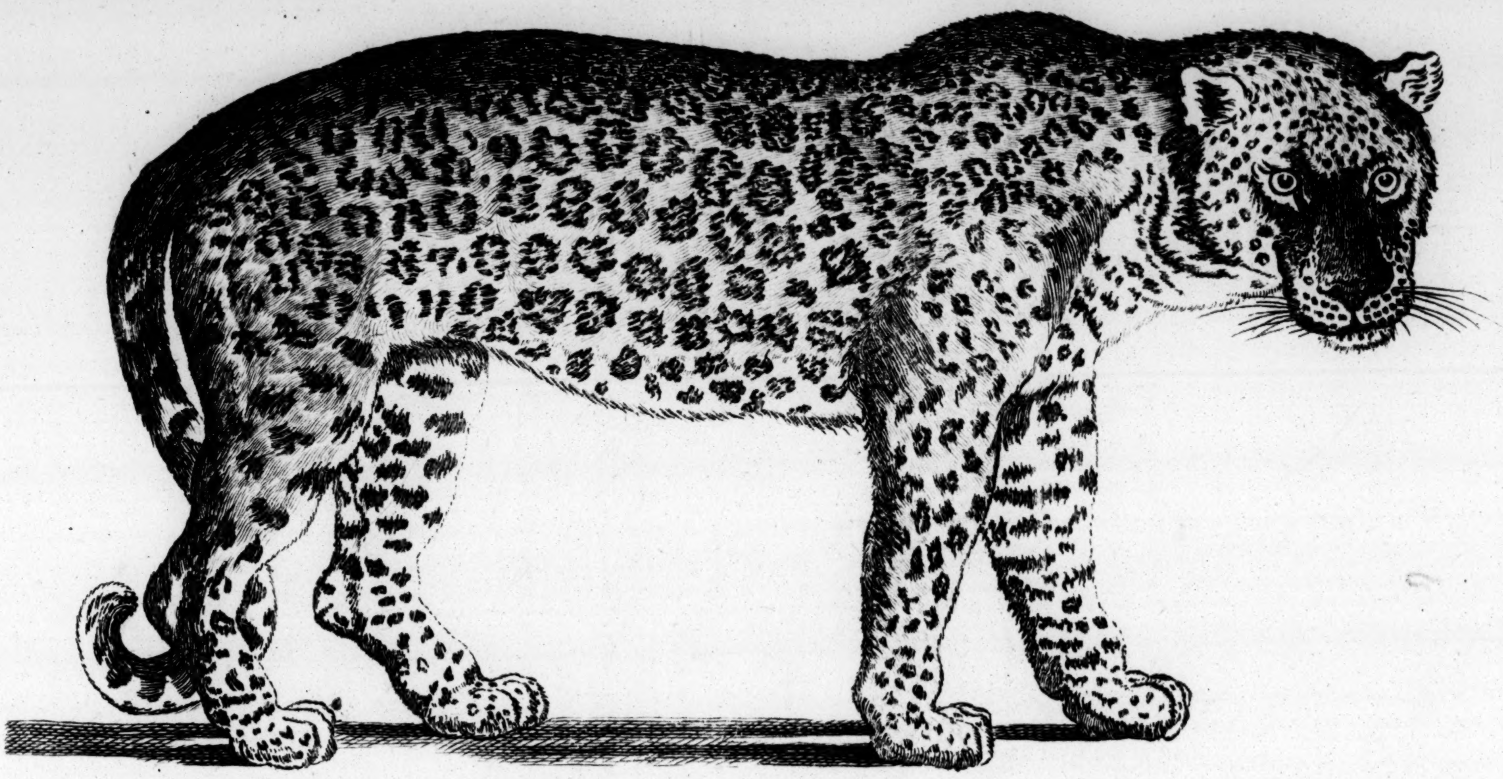
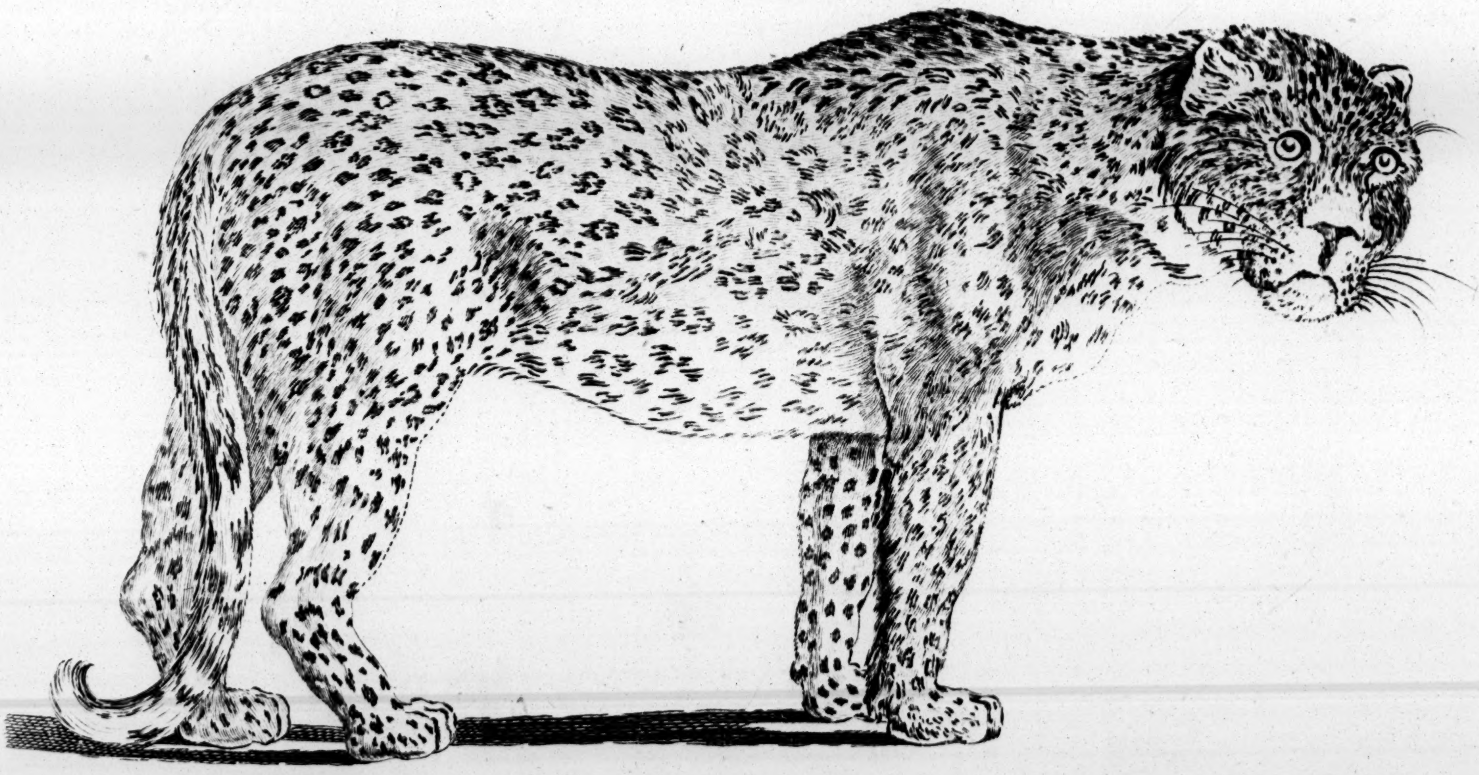


Fig. 2. Felis Leopardus *or*
Leopard



A. Bell Sculp.t

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ſhould be put into a warm room, having a candle burning by her, where ſhe is to ſit unhooded, if ſhe be not ramage, that ſhe may pick and prune herſelf.—A falconer ſhould always carry proper medicines into the field, as hawks frequently meet with accidents there. Neither muſt he forget to take with him any of his hawking implements; and it is neceſſary he ſhould be ſkilful in making lures, hoods of all ſorts, jeſſets. bewets, and other furniture. Neither ought he to be without his coping irons, to cope his hawk's beak when overgrown, and to cut her pounces and talons as there ſhall be occaſion: nor ſhould his cauterizing irons be wanting.

Falconer (William), an ingenious Scots ſailor, who, about the year 1762, came up to London with a pretty pathetic poem, called the *Shipwreck*, founded on a diſaſter of his own experience. The publication of this piece recommended him to the late duke of York; and he would in all probability have been ſuitably preferred, if a ſecond ſhipwreck, as may be ſuppoſed, had not proved fatal to him, and to many gentlemen of rank and fortune with whom he ſailed. In 1760, he went out a volunteer in the Aurora frigate ſent to carry Meſſrs Vanſittart, Scraſton, and Ford, the ſuperviſors appointed to regulate our Eaſt India ſettlements; which veſſel, after it had touched at the Cape of Good Hope, was never more heard of. Before his departure, he publiſhed a very uſeful *Marine Dictionary*, in 1 vol. 4to.

FALCONRY, the art of training all manner of hawks, but more eſpecially the larger ones called *falcons*; to the exerciſe of hawking. See Hawking.

When a falcon is taken, ſhe muſt be ſeeled in ſuch a manner, that, as the ſeeling ſlackens, ſhe may ſee what proviſion lies before her; but care ought to be taken, not to ſeel her too hard. A falcon or hawk newly taken ſhould have all new furniture, as new jeſſes of good leather, mailled leaſhes with buttons at the end, and new bewets. There ſhould alſo be provided a ſmall round ſtick, to ſtroke the hawk; becauſe, the oftener this is done, the ſooner and better will ſhe be manned. She muſt alſo have two good bells, that ſhe may be found when ſhe ſcattereth. Her hood ſhould be well faſhioned, raiſed, and emboſſed againſt her eyes, deep, and yet ſtrait enough beneath, that it may faſten about her head without hurting her; and her beak and talons muſt be a little coped, but not ſo near as to make them bleed.

If it be a ſoar-falcon, which hath already paſſed the ſeas, ſhe will indeed be harder to reclaim, but will prove the beſt of falcons. Her food muſt be good and warm, and given her twice or thrice a-day, till ſhe be full gorged: the beſt for this purpoſe is pigeons, larks, or other live birds; becauſe ſhe muſt be broken off by degrees from her accuſtomed feeding. When ſhe is fed, you muſt hoop and lure, as you do when you call a hawk, that ſhe may know when you intend to give her meat. On this occaſion ſhe muſt be unhooded gently; and after giving her two or three bits, her hood muſt be put on again, when ſhe is to get two or three bits more. Care muſt be taken that ſhe be cloſe ſeeled; and after three or four days, her diet may be leſſened: the falconer ſetting her every night to perch by him, that he may awaken her often in the night. In this manner he muſt proceed, till he find her to grow tame and gentle; and when ſhe begins to feed eagerly, he may give her a ſheep's heart. He may now begin to unhood her in the day-time; but it muſt be far from company, firſt giving her a bit or two, then hooding her gently, and giving her as much more. When ſhe is ſharp ſet, he may now unhood her, and give her ſome meat juſt againſt his face and eyes, which will make her leſs afraid of the countenances of others. She muſt be borne continually on the fiſt, till ſhe is properly manned, cauſing her to feed in company, giving her in the morning, about ſun-riſe, the wing of a pullet; and in the evening, the foot of a hare or coney, cut off above the joint, flead and laid in water, which being ſqueezed, is to be given her with the pinion of a hen's wing. For two or three days give her waſhed meat, and then plumage in more or leſs quantity as ſhe is thought to be more or leſs foul within. After this, being hooded again, ſhe is to get nothing till ſhe has gleamed and caſt, when a little hot meat may be given her in company; and, towards evening, ſhe may be allowed to plume a hen's wing in company alſo. Cleanſe the feathers of her caſting, if foul and ſlimy; if ſhe be clean within, give her gentle caſtings; and when ſhe is reclaimed, manned, and made eager and ſharp ſet, he may venture to feed her on the lure.

However, three things are to be conſidered before the lure be ſhewed her, 1. That ſhe be bold and familiar in company, and not afraid of dogs and horſes. 2. Sharp ſet and hungry, having regard to the hour of morning and evening, when you would lure her. 3. Clean within, and the lure well garniſhed with meat on both ſides; and when you intend to give her the length of a leaſh, you muſt abſcond yourſelf.

She muſt alſo be unhooded, and have a bit or two given her on the lure as ſhe ſits on your fiſt; afterwards take the lure from her, and hide it that ſhe may not ſee it; and when ſhe is unſeeled, caſt the lure ſo near her, that ſhe may catch it within the length of her leaſh, and as ſoon as ſhe has ſeized it, uſe your voice as falconers do, feeding her upon the lure, on the ground, with the heart and warm thigh of a pullet.

Having ſo lured your falcon, give her but little meat in the evening; and let this luring be ſo timely, that you may give her plumage, and a juck of a joint next morning on your fiſt. When ſhe has caſt and gleamed, give her a little reaching of warm meat. About noon, tie a creance to her leaſh; and going into the field, there give her a bit or two upon her lure: then unwind the creance, and draw it after you a good way; and let him who has the bird hold his right-hand on the taſſel of her hood, ready to unhood her as ſoon as you begin to lure; to which if ſhe come well, ſtoop roundly upon it, and haſtily ſeize it, let her caſt two or three bits thereon. Then, unſeizing and taking her off the lure, hood her and give her to the man again; and, going farther off, lure and feed her as before.

In this manner is the falconer to proceed, luring her every day farther and farther off, till ſhe is accuſtomed to come freely and eagerly to the lure; after which ſhe may be lured in company, taking care that nothing affright her. When ſhe is uſed to the lure on foot, ſhe is to be lured on horſeback; which may be effected the ſooner, by cauſing horſemen to be about her when ſhe is lured on foot.

When ſhe has grown familiar to this way, let ſomebody on foot hold the hawk, and he on horſeback muſt call and caſt the lure about his head, the holder taking off the hood by the taſſel; and if ſhe ſeize eagerly on the lure without fear of man or horſe, then take off the creance, and lure her at a greater diſtance. And if you would have her love dogs as well as the lure, call dogs when you give her her living or plumage. See the article Hawking.

FALKIRK, a town of Stirlingſhire in Scotland, ſituated in W. Long. 3. 48. N. Lat. 56. 20. It is a large ill-built place, and is ſupported by great fairs for black cattle from the Highlands; it being computed that 24,000 head are annually ſold there. A great deal of money is alſo got here by the carriage of goods landed at Carron wharf to Glaſgow. This town is remarkable for a battle fought in its neighbourhood between Edward I. of England, and the Scots commanded by the Steward of Scotland, Cummin of Badenoch, and Sir William Wallace. The latter had been inveſted with the ſupreme command; but perceiving that this gave umbrage to the nobility, he reſigned his power into the hands of the noblemen above-mentioned, reſerving to himſelf only the command of a ſmall body who refuſed to follow another leader. The Scots generals placed their pikemen along the front, and lined the intervals between the three bodies of which their army was compoſed, with archers: and dreading the great ſuperiority of the Engliſh cavalry, endeavoured to ſecure their front by palliſadoes tied together with ropes. The battle was fought on the 22d of July 1298. The king of England divided his army likewiſe into three bodies; and, by the ſuperiority of his archers, defeated the Scots with great ſlaughter. Wallace alone preſerved entire the troops he commanded; and retiring behind the Carron, marched leiſurely along the banks of that river, which protected him from the enemy. In this battle fell John de Graham, a gentleman much celebrated for his valour, and ſtyled the *right-hand* of the gallant Wallace. His epitaph is ſtill to be ſeen on a plain ſtone in the church-yard of Falkirk. On the 18th of January 1746, a battle was fought here between the king's forces commanded by general Hawley, and the Highlanders headed by Charles Stuart. The former was ſeized with a panic, and fled; but Colonel Huſk with two regiments, who kept their ground, prevented the Highlanders from purſuing their victory. Extenſive ruins are perceived in the neighbourhood of this town, ſuppoſed by ſome antiquarians to have been the capital of the Pictiſh government; but others believe them to be the remains of ſome Roman ſtations.

FALKLAND, a ſmall town of Fifeſhire in Scotland, made a royal burgh by James II. in 1458. Here ſtood one of the ſeats of the Macduffs earls of Fife. On the attainder of Munro Stewart, the 17th earl, it became forfeited to the crown in 1424. James V. who grew very fond of the place, enlarged and improved it. The remains evince its former magnificence and elegance, and the fine taſte of the princely architect. The gateway is placed between two fine round towers; on the right-hand joins the chapel, whoſe roof is of wood, handſomely gilt and painted, but in a moſt ruinous condition. Beneath are ſeveral apartments. The front next to the court was beautifully adorned with ſtatues, heads in baſs-relief, and elegant columns not reducible to any order, but of fine proportion, with capitals approaching the Ionic ſcroll. Beneath ſome of theſe pillars was inſcribed I. R. M. G. 1537: or *Jacobus Rex, Maria de Guiſe.*—This place was alſo a favourite reſidence of James VI. on account of the fine park and plenty of deer. The eaſt ſide was accidentally burnt in the time of Charles II. and the park ruined during Cromwell's uſurpation; when the fine oaks were cut down in order to build the fort at Perth.

Falkland (Lord). See Cary.

FALL, the deſcent of a heavy body towards the centre of the earth. It is alſo the name of a meaſure of length uſed in Scotland, containing ſix ells.

FALLACY, a deception, fraud, or falſe appearance.

The epicureans deny that there is any ſuch thing as a fallacy of the ſenſes: for, according to them, all our ſenſations and perceptions, both of ſenſe and phantaſy, are true; whence they make ſenſe the primary criterion of truth.

The Carteſians, on the other hand, maintain, that we ſhould ſuſpect as falſe, or at moſt as dubious, every thing that preſents itſelf to us by means only of the external ſenſes, becauſe they frequently deceive us. They add, that our ſenſes, as being fallacious, were never given us by nature for the diſcovery of truth, or the contemplation of the principles of things; but only for pointing out to us what things are convenient or hurtful to our bodies.

The Peripatetics keep a middle courſe. They ſay, that if a ſenſible object be taken in its common or general view, the ſenſe cannot be deceived about it; but that if the object be taken under its ſpecific view, the ſenſe may be miſtaken about it, from the want of the diſpoſitions neceſſary to a juſt ſenſation, as a diſorder in the organ, or any thing uncommon in the medium: thus, in ſome diſorders of the eye, all objects appear yellow; a ſtick in water appears broken or crooked, &c.

FALLING-sickness. See (the *Index* ſubjoined to) Medicine.

FALLOPIAN tubes. See Anatomy, n° 372. l.

FALLOPIUS (Gabriel), a moſt celebrated phyſician and anatomiſt, was born at Modena in Italy, in the year 1523, and deſcended of a noble family. He made ſeveral diſcoveries in anatomy, one of which was that of the tubes, called from him the *Fallopian tubes.* He travelled through the greateſt part of Europe, and obtained the character of being one of the ableſt phyſicians of his age. He was made profeſſor of anatomy at Piſa in the year 1548, and at Padua in the year 1551: here he died in 1562, aged 39. His writings, which are numerous, were firſt printed ſeparately, and afterwards collected under the title of "Opera genuina omnia, tam practica quam theoretica, in tres tomos diſtributa." They were printed at Venice in 1585, and in 1606; at Francfort in 1600, *cum operum appendice;* and in 1606, in folio.

FALLOW, a pale-red colour, like that of brick half-burnt; ſuch is that of a fallow-deer.

Fallow-*Field*, or *Fallow-ground;* land laid up, or that has been untilled for a conſiderable time.

FALLOWING *of* Land, a particular method of improving land. See Agricult. n° 15. 112. 141,—143.

FALMOUTH, a port-town of Cornwall in England, ſituated in W. Long. 5. 30. N. Lat. 50. 15. on a fine bay of the Engliſh channel, the entrance whereof is guarded by two forts.

FALSE, in general, ſomething contrary to truth, or not what it ought to be; thus we ſay a falſe action, falſe weights, falſe claim, &c.

False *Action*, if brought againſt one whereby he is caſt into priſon, and dies pending the ſuit, the law gives no remedy in this caſe, becauſe the truth or falſehood of the matter cannot appear before it is tried: and if the plaintiff is barred, or non-ſuited at common law, regularly all the puniſhment is amercement.

False *Impriſonment*, is a treſpaſs committed againſt a perſon, by arreſting and impriſoning him without juſt cauſe, contrary to law; or where a man is unlawfully detained without legal proceſs: and it is alſo uſed for a writ which is brought for this treſpaſs. If a perſon be any way unlawfully detained, it is falſe impriſonment; and conſiderable damages are recoverable in thoſe actions.

False *Oath*. See Perjury.

False *Prophecy*. See Prophecy.

False *Quarter*, or *Quittor*, in farriery. See Farriery, § xl. 4.

FALSI crimen, in the civil law, is fraudulent ſubornation or concealment, with deſign to darken or hide the truth, and make things appear otherwiſe than they are. The *crimen falſi* is committed, 1. By words, as when a witneſs ſwears falſely. 2. By writing, as when a man antedates a contract, or the like. 3. By deed, as when he ſells by falſe weights and meaſures.

FALSTAFF. See Fastolff.

FALX, in anatomy. See there, n° 395.

FAME, a heathen goddeſs, celebrated chiefly by the poets. She is feigned to have been the laſt of the race of Titans produced by the earth, to have her palace in the air, and to have a vaſt number of eyes, ears, and tongues. She is mentioned by Heſiod, and particularly deſcribed by Ovid and Virgil.

FAMES canina, the ſame with Bulimy.

FAMILY, denotes the perſons that live together in one houſe, under the direction of one head or chief manager. It alſo ſignifies the kindred or lineage of a perſon; and is uſed by old writers for a hide or portion of land ſufficient to maintain one family *.

* Hide.

Family, in natural hiſtory, a term uſed by authors to expreſs any order of animals, or other natural productions of the ſame claſs. See Class and Order.

FAN, a machine uſed to raiſe wind, and cool the air by agitating it. The cuſtom which now prevails of wearing fans was borrowed from the eaſt, where they are almoſt indiſpenſibly neceſſary for keeping off the ſun and the flies. Fans are made of a thin ſkin or a piece of paper, taffety, or other light ſtuff cut ſemicircularly, and mounted on ſeveral little ſticks of wood, ivory, tortoiſe-ſhell, or the like. The paper, &c. is uſually painted; and, in mounting, is plaited in ſuch a manner that the plaits may be alternately inward and outward.

FANATICS, wild, enthuſiaſtic, viſionary perſons, who pretend to revelation and inſpiration.

The ancients called thoſe *fanatici* who paſſed their time in temples *(fana)*, and being often ſeized, with a kind of enthuſiaſm, as if inſpired by the divinity, ſhewed wild and antic geſtures. Prudentius repreſents them as cutting and ſlaſhing their arms with knives. Shaking the head was alſo common among the fanatici; for Lampridius informs us, that the emperor Heliogabulus was arrived to that pitch of madneſs, as to ſhake his head with the gaſhed fanatics. Hence the word was applied among us to the Anabaptiſts, Quakers, &c. at their firſt riſe, and is now an epithet given to the modern prophets, muggletonians, &c.

FANCY, or imagination. See Imagination.

FANIONS, in the military art, ſmall flags carried along with the baggage.

FANSHAW (Sir Richard), famous for his embaſſies and writings, was the tenth and youngeſt ſon of Sir Henry Fanſhaw of Ware Park in Hertfordſhire, where it is ſuppoſed he was born about the year 1607. He diſtinguiſhed himſelf ſo early by his abilities, that, in 1635, he was taken into government-employments by king Charles I. and ſent reſident to the court of Spain; whence being recalled in the beginning of the troubles in 1641, he adhered to the royal intereſt, and was employed in ſeveral important matters of ſtate. During his vacant hours he wrote divers poems, and made ſeveral tranſlations. At the reſtoration it was expected he would have been made one of the ſecretaries of ſtate; however, he was made maſter of the requeſts; a ſtation, in thoſe times, of conſiderable profit. Afterwards, on account of his ſkill in the Latin language, he was made ſecretary for that tongue. In 1661, he was ſent envoy to the king of Portugal. In 1662, he was again ſent to that court with the title of *ambaſſador*, and negociated the marriage of his maſter king Charles II. with the infanta Donna Catherina. Upon his return he was made one of the privy-council. In 1664, he was ſent ambaſſador to both the courts of Spain and Portugal; at which time, the foundation of peace betwixt thoſe crowns and England was laid by him. His conduct during his former employments in thoſe courts gained him ſuch high eſteem there, that his reception was magnificent, exceeding all that were before, which thoſe kings declared was not to be a precedent to ſucceeding ambaſſadors. He died at Madrid in 1666; on the very day he had fixed for ſetting out on his return to England. Beſides ſome original poems, and others tranſlations, he publiſhed a tranſlation of Bathiſta Guarini's *Paſtor Fido*, and another of the *Luſiad* of Camoens. Among his poſthumous publications are, "Letters during his embaſſies in Spain and Portugal; with his life prefixed."

FANUM, among the Romans, a temple or place conſecrated to ſome deity. The deified men and women among the heathens had likewiſe their *fana*; even the great philoſopher Cicero erected one to his daughter Tullia.

FARANDMAN, a traveller, or merchant ſtranger, to whom, by the laws of Scotland, juſtice ought to be done with all expedition, that his buſineſs or journey be not hindered.

FARCE, was originally a droll, petty ſhew, or entertainment, exhibited by charletans, and their buffoons, in the open ſtreet to gather the crowd together.—The word is French, and ſignifies literally, "force-meat or ſtuffing." It was applied on this occaſion, no doubt, on account of the variety of jeſts, gibes, tricks, &c. wherewith the entertainment was interlarded. Some authors derive farce from the Latin *facetia;* others from the Celtic *farce*, "mockery;" other from the Latin *faccire*, "to ſtuff."

At preſent it is removed from the ſtreet to the theatre; and inſtead of being performed by merry-andrews to amuſe the rabble, is acted by comedians, and become the entertainment of a polite audience. Poets have reformed the wildneſs of the primitive farces, and brought them to the taſte and manner of comedy. The difference between the two on our ſtage is, that comedy keeps to nature and probability, and therefore is confined to certain laws preſcribed by ancient critics; whereas farce diſallows of all laws, or rather ſets them aſide on occaſion. Its end is purely to make merry; and it ſticks at nothing which may contribute thereto, however wild and extravagant. Hence the dialogue is uſually low, the perſons of inferior rank, the fable or action trivial or ridiculous, and nature and truth every where heightened and exaggerated to afford the more palpable ridicule.

FARCIN, Farcy, or *Faſhions*, in farriery. See Farriery, § xx.

FARDING-deal, the fourth part of an acre of land. See Acre.

FARE, moſt commonly ſignifies the money paid for a voyage, or paſſage by water; but, in London, it is what perſons pay for being conveyed from one part of the town to another in a coach or chair.

FAREWELL-cape, the moſt ſoutherly promontory of Greenland, in W. Long. 50°, and N. Lat. 60°.

FARIN, or Farm. See Farm.

FARINA, a Latin term ſignifying meal, or the flour of corn. See Corn.

Farina *Fœcundans*, among botaniſts, the ſuppoſed impregnating meal or duſt on the apices or antheræ of flowers. See Pollen.

The manner of gathering the farinæ of plants for microſcopical obſervations is this: gather the flowers in the midſt of a dry ſunſhiny day when the dew is perfectly off, then gently ſhake off the farina, or lightly bruſh it off with a ſoft hair-pencil, upon a piece of white paper; then take a ſingle talc or iſinglaſs between the nippers, and, breathing on it, apply it inſtantly to the farinæ, and the moiſture of the breath will make that light powder ſtick to it. If too great a quantity be found adhering to the talc, blow a little of it off, and, if there is too little, breathe upon it again, and take up more. When this is done, put the talc into the hole of a ſlider, and, applying it to the microſcope, ſee whether the little grains are laid as you deſire; and if they are, cover them up with another talc, and fix the ring; but be careful that the talcs do not preſs upon the farina in ſuch a manner as to alter its form.

FARINELLI, the Italian ſinger ſo famous in England ſome time ago, and whoſe proper name was *Carlo Broſchi*, was born at Naples in 1705. He had his firſt muſical education under his father, and was afterwards educated under Porpora, who travelled with him. He was 17 years of age when he went to Rome; where, during the run of an opera, there aroſe a ſtruggle every night, between him and a famous trumpeter who accompanied him in a ſong, for execution and ſtrength of lungs in holding out longeſt; and his fame may be dated from his victory in this conteſt. In 1734, he came to England, where his muſical talents enraptured every audience: ſweetneſs, ſtrength, and compaſs, were found in his voice; and, in his ſtyle, the tender, the graceful, and the rapid. He is ſaid to have poſſeſſed powers that never met before, or ſince, in any one human being; and which proved therefore irreſiſtible. With this character he went to Spain in the year 1737, with a full deſign to return to England; being under articles to the nobility, who then managed the opera, to perform the enſuing ſeaſon: but the firſt day he performed before the king and queen of Spain, it was determined to take him into the ſervice of the court; a penſion of above 2000l. a-year was ſettled on him, and he was never more ſuffered to ſing in public. On the death of Philip V. he continued in favour under his ſucceſſor Ferdinand VI. who, in 1750, dignified him with the order of Calatrava. But when the preſent king aſcended the throne, he was obliged to quit Spain, though his penſion was continued; he then returned to Italy, where all his old relations and friends being dead or removed, he had a ſecond life to begin in his own country, among ſtrangers. Dr Burney viſited Farinelli in 1770, and the above account of him is abſtracted from the Doctor's "Preſent ſtate of muſic in France and Italy."

FARLEU, money paid by the tenants in the weſt of England, in lieu of a heriot. In ſome manors of Devonſhire, farleu is often diſtinguiſhed to be the beſt goods, as heriot is the beſt beaſt, payable at the death of a tenant.

FARM, farin, or *Ferm, (Firma)*, in law, ſignifies a little country meſſuage, or diſtrict; containing houſe and land, with other conveniencies; hired, or taken by leaſe, either in writing, or parole, under a certain yearly rent. See Lease.

This in divers parts is differently termed: in the north, it is a *tack;* in Lancaſhire, a *fermeholt;* in Eſſex, a *wike*, &c.

In the corrupted Latin, *firma* ſignified a place incloſed, or ſhut in: whence, in ſome provinces, Menage obſerves, they call *cloſerie*, or *cloſure*, what in others they call a *farm*. Add, that we find *locare ad firmam*, to ſignify to let to *farm;* probably on account of the ſure hold the tenant here has in compariſon of tenants at will.

Spelman and Skinner, however, chooſe to derive the word *farm* from the Saxon *fearme*, or *feorme*, that is, *victus*, "proviſion;" by reaſon the country people and tenants anciently paid their rents in victuals and other neceſſaries, which were afterwards converted into the payment of a ſum of money. Whence a *farm* was originally a place that furniſhed its landlord with proviſions. And among the Normans they ſtill diſtinguiſh between farms that pay in kind, *i. e.* proviſions, and thoſe which pay in money; calling the former ſimply *fermes*, and the latter *blanche ferme*, "white ferm."

Spelman ſhews, that the word *firma*, anciently ſignified not only what we now call a *farm*, but alſo a feaſt or entertainment, which the former gave the proprietor or landlord, for a certain number of days, and at a certain rate, for the lands he held of him. Thus *fearme* in the laws of king Canutus is rendered by Mr Lambard, *victus:* and thus we read of *reddere firmam unius noctis*, and *reddebat unum diem de firma;* which denote proviſion for a night and day, the rents about the time of the conqueſt being all paid in proviſions; which cuſtom is ſaid to have been firſt altered under king Henry I. We alſo ſay *to farm* duties, impoſts, &c.

Culture of a Farm. See Agriculture.

Farm, as connected with gardening, and ſuſceptible of embelliſhment. See Gardening.

In ſpeculation, it might have been expected that the firſt eſſays of improvement ſhould have been on a farm, to make it both advantageous and delightful; but the fact was otherwiſe: a ſmall plot was appropriated to pleaſure; the reſt was reſerved for profit only. And this may, perhaps, have been a principal cauſe of the vicious taſte which long prevailed in gardens. It was imagined that a ſpot ſet apart from the reſt ſhould not be like them: the conceit introduced deviations from nature, which were afterwards carried to ſuch an exceſs, that hardly any objects truly rural were left within the encloſure, and the view of thoſe without was generally excluded. The firſt ſtep, therefore, towards a reformation, was by opening the garden to the country, and that immediately led to aſſimilating them; but ſtill the idea of a ſpot appropriated to pleaſure only prevailed, and one of the lateſt improvements has been to blend the uſeful with the agreeable; even the ornamented farm was prior in time to the more rural; and we have at laſt returned to ſimplicity by force of refinement.

Of a paſtoral farm.

1. The ideas of paſtoral poetry ſeem now to be the ſtandard of that ſimplicity; and a place conformable to them is deemed a farm in its utmoſt purity. An alluſion to them evidently enters into the deſign of the Leaſowes (a), where they appear ſo lovely as to endear the memory of their author; and juſtify the reputation of Mr Shenſtone, who inhabited, made, and celebrated the place: it is a perfect picture of his mind, ſimple, elegant, and amiable; and will always ſuggeſt a doubt, whether the ſpot inſpired his verſe, or whether, in the ſcenes which he formed, he only realized the paſtoral images which abound in his ſongs. The whole is in the ſame taſte, yet full of variety; and, except in two or three trifles, every part is rural and natural. It is literally a grazing farm lying round the houſe; and a walk, as unaffected and as unadorned as a common field-path, is conducted through the ſeveral encloſures. But for a detail of the plan and ſcenery, as illuſtrative of the preſent ſubject, the reader is referred to the particular deſcription of the Leaſowes publiſhed by the late Mr Dodſley. We ſhall only take notice of one or two circumſtances independent on the general delineation.

The art with which the diviſions between the fields are diverſified is one of them. Even the hedges are diſtinguiſhed from each other: a common quickſet fence is in one place the ſeparation; in another, it is a lofty hedge-row, thick from the top to the bottom; in a third, it is a continued range of trees, with all their ſtems clear, and the light appearing in the intervals between their boughs, and the buſhes beneath them; in others, theſe lines of trees are broken, a few groupes only being left at different diſtances; and ſometimes a wood, a grove, a coppice, or a thicket, is the apparent boundary, and by them both the ſhape and the ſtyle of the encloſures are varied.

The inſcriptions, which abound in the place, are another ſtriking peculiarity; they are well known and juſtly admired; and the elegance of the poetry, and the aptneſs of the quotations, atone for their length and their number. But, in general, inſcriptions pleaſe no more than once: the utmoſt they can pretend to, except when their alluſions are emblematical, is to point out the beauties, or deſcribe the effects, of the ſpots they belong to; but thoſe beauties and thoſe effects muſt be very faint, which ſtand in need of the aſſiſtance. Inſcriptions, however, to commemorate a departed friend, are evidently exempt from the cenſure; the monuments would be unintelligible without them; and an urn, in a lonely grove, or in the midſt of a field, is a favourite embelliſhment at the Leaſowes: they are indeed among the principal ornaments of the place; for the buildings are moſtly mere ſeats, or little root-houſes; a ruin of a priory is the largeſt, and that has no peculiar beauty to recommend it: but a multiplicity of objects are unneceſſary in the farm; the country it commands is full of them; and every natural advantage of the place within itſelf has been diſcovered, applied, contraſted, and carried to the utmoſt perfection, in the pureſt taſte, and with inexhauſtible fancy.

Among the ideas of paſtoral poetry which are here introduced, its mythology is not omitted: but the alluſions are both to ancient and to modern fables; ſometimes to the fairies; and ſometimes to the naiads and muſes. The objects alſo are borrowed partly from the ſcenes which this country exhibited ſome centuries ago, and partly from thoſe of Arcadia: the priory, and a Gothic ſeat, ſtill more particularly characteriſed by an inſcription in obſolete language and the black letter, belong to the one; the urns, Virgil's obeliſk, and a ruſtic temple of Pan, to the other. All theſe alluſions and objects are indeed equally rural: but the images in an Engliſh and a claſſical eclogue are not the ſame; each ſpecies is a diſtinct imitative character. Either is proper; either will raiſe the farm it is applied to above the ordinary level; and within the compaſs of the ſame place both may be introduced; but they ſhould be ſeparate: when they are mixed, they counteract one another; and no repreſentation is produced of the times and the countries they refer to. A certain diſtrict ſhould therefore be allotted to each, that all the fields which belong to the reſpective characters may lie together, and the correſponding ideas be preſerved for a continuance.

Of an ancient farm.

2. In ſuch an aſſortment, the more open and poliſhed ſcenes will generally be given to the Arcadian ſhepherd; and thoſe in a lower degree of cultivation, will be thought more conformable to the *manners of the ancient Britiſh yeomanry*. We do not conceive that the country in their time was entirely cleared, or diſtinctly divided; the fields were ſurrounded by woods, not by hedges; and if a conſiderable tract of improved land lay together, it ſtill was not ſeparated into a number of incloſures. The ſubjects, therefore, proper to receive this character, are thoſe in which cultivation ſeems to have encroached on the wild, not to have ſubdued it; as the bottom of a valley in corn, while the ſides are ſtill overgrown with wood; and the outline of that wood indented by the tillage creeping more or leſs up the hill. But a glade of graſs, thus circumſtanced, does not peculiarly belong to the ſpecies: that may

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(a) In Shropſhire, between Birmingham and Stourbridge.

occur in a park or paſtoral farm; in this, the paſtures ſhould rather border on a waſte or a common: if large, they may be broken by ſtraggling buſhes, thickets, or coppices; and the ſcattered trees ſhould be beſet with brambles and briars. All theſe are circumſtances which improve the beauty of the place; yet appear to be only remains of the wild, not intended for embelliſhment. Such interruptions muſt, however, be leſs frequent in the arable parts of the farm; but there the opening may be divided into ſeveral lands, diſtinguiſhed, as in common fields, only by different ſorts of grain. Theſe will ſufficiently break the ſameneſs of the ſpace; and tillage does not furniſh a more pleaſing ſcene, than ſuch a ſpace ſo broken, if the extent be moderate, and the boundary beautiful.

As much wood is eſſential to the character, a ſpot may eaſily be found, where turrets riſing above the covert, or ſome arches ſeen within it, may have the reſemblance of a caſtle or an abbey. The partial concealment is almoſt neceſſary to both; for to accord with the age, the buildings muſt ſeem to be entire; the ruins of them belong to later days: the diſguiſe is, however, advantageous to them as objects; none can be imagined more pictureſque, than a tower boſomed in trees, or a cloyſter appearing between the ſtems and the branches. But the ſuperſtitions of the times furniſh other objects, which are more within compaſs: hermitages were then real; ſolitary chapels were common; many of the ſprings of the country being deemed holy wells, were diſtinguiſhed by little Gothic domes built over them; and every hamlet had its croſs; even this, when perfect, ſet on a little ruſtic pillar, and that raiſed upon a baſe of circular ſteps, may in ſome ſcenes be conſiderable: if a ſituation can be found for a May-pole, whence it would not obtrude itſelf on every view, that alſo might not be improper; and an ancient church, however unwelcome it may be when it breaks into the deſign of a park or a garden, in ſuch a farm as this would be a fortunate accident: nor would the old yew in the church-yard be indifferent; it would be a memorial of the times when it was uſeful.

Many other objects, ſignificant of the manners of our anceſtors, might perhaps, upon recollection, occur; but theſe are amply ſufficient for a place of conſiderable extent; and cottages muſt abound in every age and every country; they may therefore be introduced in different forms and poſitions. Large pieces of water are alſo particularly proper; and all the varieties of rills are conſiſtent with every ſpecies of farm. From the concurrence of ſo many agreeable circumſtances in this, be the force or the effect of the character what it may, a number of pleaſing ſcenes may be exhibited either in a walk or riding, to be contraſted to thoſe which in another part of the place may be formed on Arcadian ideas; or even to be ſubſtituted in their ſtead, if they are omitted.

Of a ſimple farm.

3. A part may alſo be free from either of theſe imitative characters, and laid out in a common ſimple farm. Some of the greateſt beauties of nature are to be found in the fields, and attend an ordinary ſtate of cultivation: wood and water may there be exhibited in ſeveral forms and diſpoſitions; we may enlarge or divide the incloſures, and give them ſuch ſhapes and boundaries as we pleaſe; every one may be an agreeable ſpot; together, they may compoſe beautiful views; the arable, the paſture, and the mead may ſucceed one another; and now and then a little wild may be intermixed without impropriety; every beauty, in ſhort, which is not unuſual in an incloſed country, whether it ariſe from neglect or improvement, is here in its place.

The buildings, alſo, which are frequent in ſuch a country, are often beautiful objects; the church and the manſion are conſiderable; the farm-yard itſelf, if an advantageous ſituation be choſen for it; if the ricks, and the barns, and the out-houſes, are ranged with any deſign to form them into groupes, and if they are properly blended with trees; may be made a pictureſque compoſition. Many of them may be detached from the groupe, and diſperſed about the grounds: the dove-cote, or the dairy, may be ſeparated from the reſt; they may be elegant in their forms, and placed wherever they will have the beſt effect. A common barn, accompanied by a clump, is ſometimes pleaſing at a diſtance; a Dutch barn is ſo when near; and an hay-ſtack is generally an agreeable circumſtance in any poſition. Each of theſe may be ſingle; and beſides theſe, all kinds of cottages are proper. Among ſo many buildings, ſome may be converted to other purpoſes than their conſtruction denotes; and, whatever be their exterior, may within be made agreeable retreats, for refreſhment, indulgence, or ſhelter.

With ſuch opportunities of improvement, even to decoration within itſelf, and with advantages of proſpect into the country about it, a ſimple farm may undoubtedly be delightful. It will be particularly acceptable to the owner, if it be cloſe to his park or his garden: the objects which conſtantly remind him of his rank, impoſe a kind of conſtraint; and he feels himſelf relieved, by retiring ſometimes from the ſplendor of a ſeat into the ſimplicity of a farm: it is more than a variety of ſcene; it is a temporary change of ſituation in life, which has all the charms of novelty, eaſe, and tranquillity, to recommend it. A place therefore, can hardly be deemed perfect, which is not provided with ſuch a retreat. But if it be the whole of the place it ſeems inadequate to the manſion: a viſitor is diſappointed; the maſter is diſſatiſfied; he is not ſufficiently diſtinguiſhed from his tenants; he miſſes the appendages incidental to his ſeat and his fortune; and is hurt at the ſimilarity of his grounds with the country about them. A paſtoral or an ancient farm is a little above the common level; but even theſe, if brought cloſe up at the door, ſet the houſe in a field, where it always appears to be neglected and naked. Some degree of poliſh and ornament is expected in its immediate environs; and a garden, tho' it be but a ſmall one, ſhould be interpoſed between the manſion and any ſpecies of farm.

An ornamented farm.

4. A ſenſe of the propriety of ſuch improvements about a ſeat, joined to a taſte for the more ſimple delights of the country, probably ſuggeſted the idea of an *ornamented farm*, as the means of bringing every rural circumſtance within the verge of a garden. This idea has been partially executed very often; but no where, perhaps, ſo completely, and to ſuch an extent, as at (B) Woburn farm. The place contains 150 acres: of which near 35 are adorned to the higheſt degree; of the reſt, about two thirds are in paſture, and the remainder

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(B) Belonging to Mrs Southcote, near Weybridge in Surry.

mainder is in tillage. The decorations are, however, communicated to every part: for they are diſpoſed along the ſides of a walk, which, with its appendages, forms a broad belt round the grazing-grounds; and is continued, though on a more contracted ſcale, thro' the arable. This walk is properly garden; all within it is farm; the whole lies on the two ſides of a hill, and on a flat at the foot of it: the flat is divided into corn-fields; the paſtures occupy the hill; they are ſurrounded by the walk, and croſſed by a communication carried along the brow, which is alſo richly dreſſed, and which divides them into two lawns, each completely encompaſſed with garden.

Theſe are in themſelves delightful; the ground in both lies beautifully; they are diverſified with clumps and ſingle trees; and the buildings in the walk ſeem to belong to them. On the top of the hill is a large octagon ſtructure; and, not far from it, the ruin of a chapel. To one of the lawns the ruin appears, on the brow of a gentle aſcent, backed and grouped with wood; from the other is ſeen the octagon, upon the edge of a ſteep fall, and by the ſide of a pretty grove, which hangs down the declivity. This lawn is further embelliſhed by a neat Gothic building; the former by the houſe, and the lodge at the entrance; and in both, other objects of leſs conſequence, little ſeats, alcoves, and bridges, continually occur.

The buildings are not, however, the only ornaments of the walk; it is ſhut out from the country, for a conſiderable length of the way, by a thick and lofty hedge-row, which is enriched with woodbine, jeſſamine, and every odoriferous plant whoſe tendrils will entwine with the thicket. A path, generally of ſand or gravel, is conducted in a waving line, ſometimes cloſe under the hedge, ſometimes at a little diſtance from it; and the turf on either hand is diverſified with little groupes of ſhrubs, of firs, or the ſmalleſt trees, and often with beds of flowers: theſe are rather too profuſely ſtrewed, and hurt the eye by their littleneſſes; but then they repleniſh the air with their perfumes, and every gale is full of fragrancy. In ſome parts, however, the decoration is more chaſte; and the walk is carried between larger lumps of evergreens, thickets of deciduous ſhrubs, or ſtill more conſiderably open plantations. In one place it is entirely ſimple, without any appendages, any gravel, or any ſunk fence to ſeparate it from the lawn; and is diſtinguiſhed only by the richneſs of its verdure, and the nicety of its preſervation. In the arable part it is alſo of green ſward, following the direction of the hedges about the ſeveral incloſures: theſe hedges are ſometimes thickened with flowering ſhrubs; and in every corner or vacant ſpace, is a roſary, a cloſe or an open clump, or a bed of flowers: but if the parterre has been rifled for the embelliſhment of the fields, the country has on the other hand been ſearched for plants new in a garden; and the ſhrubs and the flowers which uſed to be deemed peculiar to the one, have been liberally transferred to the other; while their number ſeems multiplied by their arrangement in ſo many and ſuch different diſpoſitions. A more moderate uſe of them would, however, have been better; and the variety more pleaſing, had it been leſs licentious.

But the exceſs is only in the borders of the walk; the ſcenes through which it leads are truly elegant, every where rich, and always agreeable. A peculiar cheerfulneſs overſpreads both the lawns, ariſing from the number and the ſplendor of the objects with which they abound, the lightneſs of the buildings, the inequalities of the ground, and the varieties of the plantations. The clumps and the groves, though ſeparately ſmall, are often maſſed by the perſpective, and gathered into conſiderable groupes, which are beautiful in their forms, their tints, and their poſitions. The brow of the hill commands two lovely proſpects: the one gay and extenſive, over a fertile plain, watered by the Thames, and broken by St Anne's Hill and Windſor Caſtle; a large mead, of the moſt luxuriant verdure, lies juſt below the eye, ſpreading to the banks of the river; and beyond it the country is full of farms, villas, and villages, and every mark of opulence and cultivation. The other view is more wooded: the ſteeple of a church, or the turrets of a ſeat, ſometimes riſe above the trees; and the bold arch of Walton Bridge is there a conſpicuous object, equally ſingular and noble. The incloſures on the flat are more retired and quiet; each is confined within itſelf; and all together they form an agreeable contraſt to the open expoſure above them.

With the beauties which enliven a garden are every where intermixed many properties of a farm: both the lawns are paſtured; and the lowings of the herds, the bleating of the ſheep, and the tinklings of the bell-wedder, reſound thro' all the plantations: even the clucking of poultry is not omitted; for a menagerie of a very ſimple deſign is placed near the Gothic building; a ſmall ſerpentine river is provided for the water-fowl; while the others ſtray among the flowering ſhrubs on the banks, or ſtraggle about the neighbouring lawn: and the corn-fields are the ſubjects of every rural employment, which arable land from ſeed-time to harveſt can furniſh. But though ſo many of the circumſtances occur, the ſimplicity of a farm is wanting; that idea is loſt in ſuch a profuſion of ornament; a ruſticity of character cannot be preſerved amidſt all the elegant decorations which may be laviſhed on a garden.

FARN ISLANDS, two groups of little iſlands and rocks, 17 in number, lying oppoſite to Bamborough caſtle in Northumberland. At low-water, the points of ſeveral others are viſible beſides the 17 juſt mentioned. The neareſt iſland to the ſhore is called the *Houſe-iſland*, and lies exactly one mile and 68 chains from the coaſt. The moſt diſtant is about ſeven or eight miles. They are rented for L. 16 *per annum:* their produce is kelp, feathers, and a few ſeals, which the tenant watches and ſhoots for the ſake of the oil and ſkins. Some of them yield a little graſs that may ſerve to feed a cow or two; which the people tranſport over in their little boats. St Cuthbert is ſaid to have paſſed the two laſt years of his life on the Houſe-iſland. A priory of Benedictines was afterwards eſtabliſhed here, for ſix or eight monks, ſubordinate to Durham. A ſquare tower, the remains of a church, and ſome other buildings, are ſtill to be ſeen on this iſland; and a ſtone coffin, which is pretended to be that of St Cuthbert. At the north end of the iſle is a deep chaſm, from the top to the bottom of the rock, communicating with the ſea; through which, in tempeſtuous weather, the water is forced with great violence and noiſe, and forms a fine jet d'eau of 60 feet high. It is called by the inhabitants of the oppoſite coaſt, the *Churn*. One of the iſlands in the moſt diſtant groupe is called the *Pinnacles*, from ſome vaſt columnar rocks at the ſouth end, even at their ſides, flat at the tops, and entirely covered with guillemots and ſhags. The fowlers paſs from one to the other of theſe columns by means of a narrow board, which they place from top to top, forming a narrow bridge over ſuch a dreadful gap that the very ſight of it ſtrikes one with horror.

FARNABIE (Thomas), ſon of a carpenter at London, born in 1575, ſtaid a ſhort while at Oxford; where being enticed to abandon his religion, he went to Spain, and was there educated in a college belonging to the Jeſuits. Being weary of their ſevere diſcipline, he went with Sir John Hawkins and Sir Francis Drake in their laſt voyage in 1595. He was afterwards a ſoldier in the Low Countries: but being reduced to great want, returned to England, where wandering about for ſome time under the name of *Thomas Bainraſe*, the anagram of his name, he ſettled at Mattock in Somerſetſhire, and taught a grammar-ſchool with good reputation. He removed to London, and opened a ſchool with large accommodations for young gentlemen. While he taught this ſchool he was made maſter of arts at Cambridge, and incorporated into the univerſity of Oxford. Thence he removed, in 1636, to Seven-oaks in Kent; and taught the ſons of ſeveral noblemen and gentlemen, who boarded with him, with great ſucceſs, and grew rich. His works gained him reputation. Upon the breaking out of the civil commotions in 1641, he was caſt into priſon. It was debated in the houſe of commons, whether he ſhould be ſent to America; but this motion being rejected, he was removed to Ely-houſe in Holborn, and there he died in 1647. Mr Farnabie was a very eminent grammarian; and many writers have ſpoken with great approbation of his labours. M. Bayle in particular ſays, "His notes upon moſt of the ancient Latin poets have been of very great uſe to young beginners; being ſhort, learned, and deſigned chiefly to clear up the text."

FARQUHAR (George), an ingenious poet and dramatic writer, the ſon of a clergyman in Ireland, was born at Londonderry in 1678. He was ſent to Trinity College, Dublin; but his volatile diſpoſition not reliſhing a college life, he betook himſelf to the ſtage; where, having dangerouſly wounded a brother-actor in a tragic ſcene, by forgetting to change his ſword for a foil, it ſhocked him ſo much that he left the Dublin theatre and went to London. Here he procured a lieutenant's commiſſion by the intereſt of the earl of Orrery; which he held ſeveral years, and gave many proofs both of courage and conduct. In 1698, he wrote his firſt comedy called *Love and a Bottle;* which, for its ſprightly dialogue and buſy ſcenes, was well received. In the beginning of the year 1700, which was the jubilee year at Rome, he brought out his *Conſtant Couple, or a Trip to the Jubilee:* and ſuited Mr Wilks's talents ſo well in the character of Sir Harry Wildair, that the player gained almoſt as much reputation as the poet. This tempted him to continue it in another comedy called *Sir Harry Wildair, or the Sequel of the Trip to the Jubilee;* in which Mrs Oldfield acquired great applauſe. In 1702, he publiſhed his Miſcellanies, which contain a variety of humorous ſallies of fancy. In 1703, appeared the *Inconſtant, or the Way to win him;* in 1704, a farce called *the Stage-coach;* in 1705, *The Twin Rivals;* and in 1706, the *Recruiting Officer*, founded on his own obſervations while on a recruiting party at Shrewſbury. His laſt comedy was the *Beaux Stratagem*, of which he did not live to enjoy the full ſucceſs.

Mr Farquhar married in 1703. Before that time his manner of life had been rather diſſipated. The lady, therefore, who afterwards became his wife, having fallen violently in love with him, but judging that a gentleman of his humour would not eaſily be drawn into the trammels of matrimony, contrived to have it given out that ſhe was poſſeſſed of a large forturne; and finding means afterwards to let Mr Farquhar know her attachment to him, the united powers of intereſt and vanity perfectly got the better of his paſſion for liberty, and they were united in the hymeneal bands. But how great was his diſappointment, when he found all his proſpects overclouded ſo early in life, (for he was then no more than 24), by a marriage from which he had nothing to expect but an annual increaſe of family, and an enlargement of expence in conſeqnence of it far beyond what his income would ſupport. Yet, to his honour be it told, though he found himſelf thus deceived in a moſt eſſential particular, he never was known once to upbraid his wife with it; but generouſly forgave an impoſition which love for him alone had urged her to, and even behaved to her with all the tenderneſs and delicacy of the moſt indulgent huſband.

Mrs Farquhar, however, did not very long enjoy the happineſs ſhe had purchaſed by this ſtratagem: for the circumſtances that attended this union were in ſome reſpect perhaps the means of ſhortening the period of the captain's life. For, finding himſelf conſiderably involved in debt in conſequence of their increaſing family, he was induced to make application to a certain noble courtier, who had frequently profeſſed the greateſt friendſhip for him, and given him the ſtrongeſt aſſurances of his intended ſervices. This pretended patron repeated his former declarations; but, expreſſing much concern that he had nothing at preſent immediately in his power, adviſed him to convert his commiſſion into money to anſwer his preſent occaſions, and aſſured him that in a ſhort time he would procure another for him. Farquhar, who could not bear the thoughts of his wife and family being in diſtreſs, followed this advice, and ſold his commiſſion; but, to his great mortification and diſappointment, found, on a renewal of his application to this inhuman nobleman, that he had either entirely forgotten, or had never intended to perform, the promiſe he had made him. This diſtracting fruſtration of all his hopes fixed itſelf ſo ſtrongly on our author's mind, that it ſoon brought on him a ſure, though not a very ſudden declenſion of nature, which at length carried him off the ſtage of life in 1707, before he arrived at 30 years of age.— His comedies are ſo diverting, and the characters ſo natural, that his plays ſtill continue to be repreſented to full houſes.

FARRIER, one whoſe employment is to ſhoe horſes, and cure them when diſeaſed or lame.

FARRIERY.

FARRIERY is the art of curing the diſeaſes of horſes.

The practice of this uſeful art has been hitherto almoſt entirely confined to a ſet of men who are totally ignorant of anatomy and the general principles of medicine. It is not therefore ſurpriſing, that their preſcriptions ſhould be equally abſurd as the reaſons they give for adminiſtering them. It cannot indeed be expected that farriers, who are almoſt univerſally illiterate men, ſhould make any real progreſs in their profeſſion. They preſcribe draughts, they rowel, cauteriſe, &c. without being able to give any other reaſon for their practice, but becauſe their fathers did ſo before them. How can ſuch men deduce the cauſe of a diſeaſe from its ſymptoms, or form a rational method of cure, when they are equally ignorant of the cauſes of diſeaſes and the operation of medicines?

The miſerable ſtate of this uſeful art, eſpecially in this country, has determined us to ſelect, from the beſt authors, ſuch a ſyſtem of practice as ſeemed to be formed on rational principles; this, we hope, will be a ſufficient apology for being ſo full upon this article.

SECT. I. *General Directions with regard to the Management of Horſes.*

1. IT ought to be laid down as a general rule, to give horſes as few medicines as poſſible; and by no means to comply with the ridiculous cuſtom of ſome, who are frequently bleeding, purging, and giving balls, though their horſes be in perfect health, and have no indication that requires ſuch treatment.

2. Proper management in their feeding, exerciſe, and dreſſing, will alone cure many diſorders, and prevent moſt; for the ſimplicity of a horſe's diet, which chiefly conſiſts of grain and herbage, when good in kind, and diſpenſed with judgment, ſecures him from thoſe complicated diſorders which are the general effects of intemperance in the human body.

3. In France, Germany, and Denmark, horſes are ſeldom purged; there they depend much on alteratives; the uſe of the liver of antimony we have from the French, which is in general a good medicine for that purpoſe, and may, in many caſes, be ſubſtituted in the room of purging.

4. As hay is ſo material an article in a horſe's diet, great care ſhould be taken to procure the beſt: when it is not extraordinary, the duſt ſhould be well ſhook out before it is put in the rack; for ſuch hay is very apt to breed vermin.

5. Beans afford the ſtrongeſt nouriſhment of all grain; but are fitteſt for laborious horſes, except on particular occaſions. In ſome ſeaſons they breed a kind of vermin called the *red bugs*, which is thought to be dangerous; the beſt method in ſuch a caſe is to procure them well dried and ſplit.

6. Bran ſcalded is a kind of panada to a ſick horſe: but nothing is worſe than a too frequent uſe of it, either dry or ſcalded; for it relaxes and weakens the bowels too much. The botts in young horſes may be owing to too much muſty bran and chaff, given with other foul food to make them up for ſale; particular care therefore ſhould be taken that the bran be always ſweet and new.

7. Oats, well ripened, make a more hearty and durable diet than barley, and are much better ſuited to the conſtitutions of Britiſh horſes. A proper quantity of cut ſtraw and hay mixed with them, is ſometimes very uſeful to horſes troubled with botts, indigeſtion, &c.

8. Horſes who eat their litter, ſhould particularly have cut ſtraw and powdered chalk given them with their feed; as it is a ſign of a depraved ſtomach, which wants correcting.

9. The ſalt-marſhes are good paſture for horſes who have been ſurfeited, and indeed for many other diſorders: they purge more by dung and urine than any other paſture, and make afterwards a firmer fleſh; their water is for the moſt part brackiſh, and of courſe, as well as the graſs, ſaturated with ſalts from the ſea-water.

10. A ſummer's graſs is often neceſſary; more particularly to horſes glutted with food, and which uſe little exerciſe: but a month or two's running is proper for moſt; thoſe eſpecially who have been worked hard, and have ſtiff limbs, ſwelled legs, or wind-galls. Horſes whoſe feet have been impaired by quittors, bad ſhoeing, or any other accidents, are alſo beſt repaired at graſs. Thoſe lameneſſes particularly require turning out to graſs, where the muſcles or tendons are contracted or ſhrunk; for by the continual gentle exerciſe in the field, with the aſſiſtance of a pattin-ſhoe on the oppoſite foot, the ſhortened limb is kept on the ſtretch, the waſted parts are reſtored to their ordinary dimenſions, and the limb again recovers its uſual tone and ſtrength.

11. The fields which lie near great towns, and are much dunged, are not proper paſture for horſes; but on obſervation appear very injurious to them, if they feed thereon all the ſummer.

12. Horſes may be kept abroad all the year, where they have a proper ſtable or ſhed to ſhelter them from the weather, and hay at all times to come to. So treated, they are ſeldom ſick; their limbs are always clean and dry; and, with the allowance of corn, will hunt, and do more buſineſs than horſes kept conſtantly within doors.

13. If horſes, when taken from graſs, ſhould grow hot and coſtive, mix bran and chopt hay with their corn; and give them ſometimes a feed of ſcalded bran for a fortnight, or longer: let their exerciſe and diet be moderate for ſome time, and increaſe both by degrees.

14. When horſes are ſoiled in the ſtable, care ſhould be taken that the herbage is young, tender, and full of ſap; whether it be green barley, tares, clover, or any thing elſe the ſeaſon produces; and that it be cut freſh once every day at leaſt, if not oftener.

15. When horſes loſe their fleſh much in ſoiling, they ſhould in time be taken to a more ſolid diet: for it is not in ſoiling as in grazing; where, tho' a horſe loſes his fleſh at firſt, yet, after the graſs has purged him, he ſoon grows fat.

16. Young horſes who have not done growing, muſt be indulged more in their feeding, than thoſe come to

General Directions.

their maturity; but if their exerciſe is ſo little as to make it neceſſary to abridge their allowance of hay, a little freſh ſtraw ſhould conſtantly be put in their racks, to prevent their nibbling the manger, and turning crib-biters; they ſhould alſo be ſometimes ſtrapped back in order to cure them of this habit.

17. It is obvious to every one, what care ſhould be taken of a horſe after violent exerciſe, that he cool not too faſt, and drink no cold water, &c. for which reaſon we ſhall wave particular directions.

18. Moſt horſes fed for ſale, have the interſtices of their muſcles ſo filled with fat, that their true ſhapes are hardly known. For which reaſon a horſe juſt come out of the dealer's hands, ſhould at firſt be gently uſed. He ought to loſe blood, and have his diet lowered, tho' not too much: walking exerciſe is moſt proper at firſt, two hours in a day; in a week or fortnight two hours at a time, twice a-day; after this uſage for a month, bleed him again, and give him two or three times a-week ſcalded bran, which will prepare him for purging phyſic, that may now be given ſafely, and repeated at the uſual intervals.

19. When a horſe comes out of a dealer's hands, his cloathing muſt be abated by degrees, and care taken to put him in a moderately warm ſtable; otherwiſe the ſudden tranſition would be attended with the worſt conſequences.

SECT. II. *Some General Directions in regard to Bleeding, Purging, &c.*

1. HORSES who ſtand much in ſtable, and are full fed, require bleeding now and then; eſpecially when their eyes look heavy, dull, red, and inflamed; as alſo, when they feel hotter than uſual, and mangle their hay.

Young horſes ſhould be bled when they are ſhedding their teeth, as it takes off thoſe feveriſh heats they are then ſubject to. But the caſes that chiefly require bleeding, are colds, fevers of moſt kinds, falls, bruiſes, hurts of the eyes, ſtrains, and all inflammatory diſorders, &c.

It is right to bleed a horſe, when he begins to grow fleſhy at graſs, or at any other time when he looks heavy: and it is generally proper to bleed before purging.

Let your horſe always be bled by meaſure, that you may know what quantity you take away: two or three quarts are always enough at one time; when you repeat it, allow for the diſorder and the horſe's conſtitution.

Let the blood, when cold, be carefully examined, both as to colour and conſiſtence, whether black, florid, ſizey, &c.

2. Purging is often neceſſary in groſs full horſes, in ſome diſorders of the ſtomach, liver, &c. but ſhould be directed with caution. Before a purge is given to any horſe, it is neceſſary ſome preparation ſhould be made for it, in order to render the operation more ſafe and efficacious: thus a horſe that is full of fleſh ſhould firſt be bled, and at the ſame time have his diet lowered for a week, eſpecially thoſe that have been pampered for ſale; ſeveral maſhes of ſcalded bran ſhould alſo previouſly be given, in order to open the bowels, and unload them of any indurated excrement, which ſometimes proves an obſtacle to the working of the phyſic, by creating great ſickneſs and griping.

Of Bleeding, &c.

Let it be remembered, that a horſe is purged with difficulty; that the phyſic generally lies 24 hours in the guts before it works; and, that the tract of bowels it has to paſs through, is above 30 yards; and lying horizontally, conſequently reſinous and other improper drugs may, and often do, by their violent irritations, occaſion exceſſive gripings and cold ſweats, ſhave off the very mucus or lining of the guts, and bring on inflammations, which often terminate in mortifications, and death.

It is remarkable too, that the ſtomach and guts of a horſe are but thin, compared to ſome other animals of the ſame bulk, and therefore muſt be more liable to inflammation and irritation.

Horſes kept much in the ſtable, who have not the proper benefit of air and exerciſe in proportion to their food, ſhould in ſpring have a mild purge or two after a previous preparation by bleeding, lowering their diet, and ſcalded maſhes.

Horſes that fall off in their ſtomach, whether it proceeds from too full feeding, or ingendering crudities and indigeſted matter, ſhould have a mild purge or two.

Horſes of a hot temperament, will not bear the common aloetic purges; their phyſic therefore ſhould be mild and cooling.

Purging is always found very beneficial in ſtubborn dry coughs: but mild mercurials joined with them, make them yet more efficacious.

Horſes of a watery conſtitution, who are ſubject to ſwelled legs, that run a ſharp briny ichor, cannot have the cauſes removed any way ſo effectually as by purging.

The firſt purge you give to a horſe ſhould be mild, in order to know his conſtitution.

It is a miſtaken notion, that if a proper prepared purge does not work to expectation, the horſe will be injured by it; for though it does not paſs by ſtool, its operation may be more efficacious as an alterative to purify the blood, and it may paſs by urine or other ſecretions.

Purging medicines are very ſucceſsfully given in ſmall quantities, mixed with others; and act then as alteratives.

If mercurial phyſic is given, care ſhould be taken that it be well prepared; and warmer cloathing and greater circumſpection are then required.

Purges ſhould be given early in the morning upon an empty ſtomach: about three or four hours after the horſe has taken it, he ſhould have a feed of ſcalded bran; and a lock or two of hay may then be put into his rack. The ſame day give him two more maſhes; but ſhould he refuſe warm meat, he may be allowed raw bran.

All his water ſhould be milk-warm, and have a handful of bran ſqueezed in it; but if he refuſes to drink white water, give it him without bran.

Early the next morning give him another maſh; but if he refuſes to eat it, give him as much warm water as he will drink: let him be properly cloathed, and rode gently about. This ſhould be done two or three times a-day, unleſs he purges violently; once or twice will then be ſufficient: at night give him a feed of oats mixed with bran.

During the working, a horſe ſhould drink plentifully; but, if he will not drink warm water, he muſt be indulged with cold, rather than not drink at all.

We ſhall here inſert ſome general forms of purges.

Take ſocotorine aloes ten drams, jalap and ſalt of tartar each two drams, grated ginger one dram, oil of cloves 30 drops; make them into a ball with ſyrup of buckthorn. Or,

Take aloes and cream of tartar each one ounce, jalap two drams, cloves powdered one dram, ſyrup of buckthorn a ſufficient quantity.

Or the following, which has an eſtabliſhed character among ſportſmen.

Take aloes from ten drams to an ounce and an half, myrrh and ginger powdered each half an ounce, ſaffron and oil of anniſeed each half a dram.

Mr Gibſon recommends the following:

Take ſocotorine aloes ten drams, myrrh finely powdered half an ounce, ſaffron and freſh jalap in powder of each a dram; make them into a ſtiff ball with ſyrup of roſes, then add a ſmall ſpoonful of rectified oil of amber.

The ſoccotrine aloes ſhould always be preferred to the Barbadoes or plantation aloes: though the latter may be given to robuſt ſtrong horſes; but even then ſhould always be prepared with the ſalt or cream of tartar, which, by opening its parts, prevents its adheſion to the coats of the ſtomach and bowels; from whence horrid gripings, and even death itſelf has often enſued. This caution is well worth remarking, as many a horſe hath fallen a ſacrifice to the neglect of it.

Half an ounce of Caſtile ſoap, to a horſe of a groſs conſtitution, may be added to any of the above; and the proportions may be increaſed for ſtrong horſes.

When mercurial phyſic is intended, give two drams of calomel over night, mixed up with half an ounce of diapente and a little honey, and the purging ball the next morning.

The following, when it can be afforded, is a very gentle and effectual purge, particularly for fine delicate horſes; and if prepared with the Indian rhubarb, will not be expenſive.

Take of the fineſt ſocotorine aloes one ounce, rhubarb powdered half an ounce or ſix drams, ginger grated one dram; make into a ball with ſyrup of roſes.

The following purging drink may be given with the utmoſt ſafety; it may be quickened, or made ſtronger, by adding an ounce more ſenna, or two drams of jalap.

Take ſenna two ounces; infuſe it in a pint of boiling water two hours, with three drams of ſalt of tartar; pour off, and diſſolve in it four ounces of Glauber's ſalts, and two or three of cream of tartar.

This laſt phyſic is cooling, eaſy, and quick in its operation; and greatly preferable in all inflammatory caſes to any other purge, as it paſſes into the blood, and operates alſo by urine.

When horſes loſe their appetites after purging, it is neceſſary to give them a warm ſtomach-drink made of an infuſion of camomile-flowers, anniſeeds, and ſaffron: or the cordial ball may be given for that purpoſe.

Should the purging continue too long, give an ounce of diaſcordium in an Engliſh pint of Port-wine; and repeat it once in 12 hours, if the purging continues. Plenty of gum-arabic water ſhould alſo be given; and, in caſe of violent gripes, fat broth glyſters, or tripe liquor, ſhould be often thrown up, with 100 drops of laudanum in each.

The arabic ſolution may be thus prepared.

Take of gum arabic and tragacanth of each four ounces, juniper-berries and carraway-ſeeds of each an ounce, cloves bruiſed half an ounce; ſimmer gently in a gallon of water, till the gums are diſſolved: give a quart at a time in half a pail of water; but if he will not take it freely this way, give it him often in a horn.

When a purge does not work, but makes the horſe ſwell, and refuſe his food and water, which is ſometimes the effect of bad drugs or catching cold, warm diuretics are the only remedy; of which the following are recommended.

Take a pint of white-wine, nitre one ounce; mix with it a dram of camphire, diſſolved in a little rectified ſpirit of wine; then add two drams of oil of juniper, and the ſame quantity of unrectified oil of amber, and four ounces of honey or ſyrup of marſhmallows.

When a horſe ſwells with much phyſic, do not ſuffer him to be rode about till he has ſome vent; but rather lead him gently in hand till ſome evacuation is obtained.

As it is obſerved, that horſes more willingly take ſweet and palatable things than thoſe that are bitter and of an ill taſte, care ſhould be taken that the latter be given in balls, and that their drinks be always contrived to be as little nauſeous as poſſible, and ſweetened either with honey or liquorice. Thoſe that are prepared with groſs powders are by no means ſo agreeable to a horſe, as thoſe made by infuſion; as the former often clam the mouth, irritate the membranes about the palate and throat, and frequently occaſion the cough they are intended to prevent.

Balls ſhould be of an oval ſhape, and not exceed the ſize of a pullet's egg: when the doſe is larger, it ſhould be divided into two; and they ſhould be dipt in oil, to make them ſlip down the eaſier.

As we have given ſome general forms of purges, we ſhall obſerve the ſame rule in regard to glyſters, with ſome few cautions and remarks.

Let it be obſerved then, that, before the adminiſtring emollient clyſters in coſtive diſorders, a ſmall hand, well oiled, ſhould be paſſed up the horſe's fundament, in order to bring away any hardened dung, which otherwiſe would be an obſtacle to the glyſter's paſſage.

A bag and pipe of a proper form is to be preferred to a ſyringe, which throws up the glyſter with ſo much force, that it often ſurpriſes a horſe, and makes him reject it as faſt as it goes in; whereas the liquor, when preſſed gently from the bag, gives him no ſurpriſe or uneaſineſs, but paſſes eaſily up into the bowels, where it will ſometimes remain a long time, and be extremely uſeful, by cooling and relaxing them; and will ſometimes incorporate ſo with the dung, as not eaſily to be diſtinguiſhed from the other contents of the guts. Theſe emollient glyſters are extremely ſerviceable in moſt fevers, and greatly preferable to purging ones; which in general are too pungent, and ſtimulate too much, eſpecially if aloes are a part of the compoſition.

Nutritive glyſters are very neceſſary, and often ſave a horſe from ſtarving when his jaws are ſo locked up by convulſions that nothing can be conveyed by the mouth.

They ſhould not exceed a quart or three pints at a time, but be often repeated: nor ſhould they be too fat; but made of ſheeps heads, trotters, or any other meat-broths, milk pottage, rice-milk ſtrained, and many other ſuch nouriſhing things. For an emollient glyſter, take the following.

Take marſhmallows and camomile flowers each a large handful, bay-berries and ſweet-fennel ſeeds bruiſed each an ounce; boil in a gallon of water to three quarts, pour off into a pan, and diſſolve in it half a pound of treacle and a pint of lintſeed oil or any common oil.

To make it more laxative, add four ounces of lenitive electuary, or the ſame quantity of cream of tartar, or common purging ſalts.

Purging Glyſter. Take two or three handfuls of marſhmallows, ſenna one ounce, bitter apple half an ounce, bay-berries and anniſeeds bruiſed each an ounce, ſalt of tartar half an ounce; boil a quarter of an hour in three quarts of water; pour off, and add four ounces of ſyrup of buckthorn, and half a pint of oil.

This glyſter will purge a horſe pretty briſkly; and may be given ſucceſsfully, when an immediate diſcharge is wanting; eſpecially in ſome fevers with inflamed lungs, or other diſorders, which require ſpeedy relief.

But it is neceſſary to caution againſt a ſolution of coarſe aloes for this purpoſe, as it has been found to gripe horſes violently, and excite feveriſh and ſometimes convulſive ſymtoms; and indeed pungent and ſtimulating medicines, as the ſtronger purgatives generally are, ſhould be given in this form with great caution.

But the generality of emollient glyſters, may be prepared with much leſs trouble; as two quarts of water-gruel, with half a pound of treacle, a pint of oil, and a handful of common ſalt, will as effectually anſwer every purpoſe. The following is a reſtringent glyſter.

Take pomegranate-bark or oak-bark two ounces, red-roſe leaves freſh or dry a handful, balauſtines an ounce; boil in two quarts of water, till one is near conſumed; pour off, and diſſolve in it four ounces of diaſcordium; to which may be added a pint of Port-wine.

This will anſwer in all common caſes where reſtringents are neceſſary, but ſhould never be given in larger quantities; for the longer glyſters of this kind lie in the bowels, the more efficacious they are.

Sect. III. *Of Colds.*

By taking cold, we mean that the pores and outlets of the ſkin (which in a natural healthy ſtate of body are continually breathing out a fine fluid, like the ſteam ariſing from hot water, or ſmoke from fire) are ſo far ſhut up, that theſe ſteams, or perſpirable matter, not having a free paſſage through them, are hindered from going off in the uſual manner; the conſequence of which is, their recoiling on the blood, vitiating its quality, overfilling the veſſels, and affecting the head, glands or kernels of the neck and throat, the lungs, and other principal parts.

To enumerate the various cauſes of colds would be endleſs: the moſt uſual are, riding horſes till they are hot, and ſuffering them to ſtand in that condition where the air is cold and piercing; removing a horſe from a hot ſtable to a cold one, and too ſuddenly changing his cloathing, whence it is that horſes often catch ſuch ſevere colds after they come out of dealers hands; and by not being carefully rubbed down when they come in hot off journeys.

The ſigns of a horſe's catching cold, are a cough, heavineſs and dullneſs, which affect him more or leſs in proportion to the ſeverity of it: the eyes are ſometimes moiſt and watery, the kernels about the ears and under the jaws ſwell, the noſe gleets, and he rattles in his breathing; and when the cold is violent, the horſe will be feveriſh, his flanks work, and he will both loath his hot meat and refuſe his water. When theſe laſt ſymptoms are attended with a ſlimy mouth, ears, and feet cold, and a great inward ſoreneſs, there is danger of a bad fever.

But when the horſe coughs ſtrong, ſnorts after it, is but little off his ſtomach, pricks up his ears, and moves briſkly in his ſtall, dungs and ſtales freely, his ſkin feels kindly, and his coat does not ſtare, he is in no danger, and there will be no occaſion for medicines of any kind; but you ſhould bleed him about two quarts, keep him warm, and give him feeds of ſcalded ban, with as much warm water as he will drink, in order to dilute his blood.

If the diſorder ſhould increaſe, the horſe feel hot, and refuſe his meat, bleed him, if ſtrong, two quarts more; and if you are not ſatisfied without giving medicines, avoid, as you would poiſon, a farrier's drench; (which is generally compoſed of ſome hot, mauſeous powders, given in a quantity of ale; which too often increaſes the fever by overheating the blood, and palls the horſe's ſtomach by its loathſomneſs:) and inſtead of it, infuſe two ounces of anniſeeds with a dram of ſaffron, in a pint and a half of boiling water; pour off the clear liquor, and diſſolve in it four ounces of honey, to which may be added four ſpoonfuls of ſallad-oil: this drink may be given every night; or one of the following balls, provided there is no fever, in which caſe it always will be more eligible to give two or three ounces of nitre or ſalt prunella every day in his feeds or water till it is removed; but ſhould the horſe be inclined to coſtiveneſs, remember that his body ſhould be kept open by emollient glyſters, or cream of tartar diſſolved in his water, to the quantity of three or four ounces a-day.

Pectoral Horſe-ball. Take of the freſh powders of anniſeed, elicampane, carraway, liquorice, turmerick, and flour of brimſtone, each three ounces; juice of liquorice four ounces, diſſolved in a ſufficient quantity of mountain; ſaffron powdered half an ounce, ſallad-oil and honey half a pound, oil of anniſeed one ounce: mix together with wheat-flour enough to make them into a paſte.

Or the following from Dr Bracken.

Take anniſeed, carraway ſeed, and greater cardamoms, finely powdered, of each one ounce, flour of brimſtone two ounces, turmerick in fine powder one ounce and a half, ſaffron two grains, Spaniſh juice diſſolved in water two ounces, oil of anniſeed half an ounce, liquorice-powder one ounce and a half, wheat-flour a ſufficient quantity to make into a ſtiff paſte by beating all the ingredients well in a mortar.

Theſe balls conſiſt of warm opening ingredients; and, given in ſmall quantities, about the ſize of a pullet's egg, will encourage a free perſpiration; but, in caſe of a fever, ſhould be cautiouſly continued. They are much more efficacious and in all caſes ſuperior to the farriers drenches, if diſſolved in a pint of warm ale.

This ſimple method, with good nurſing and hot maſhes, warm water and cloathing, eſpecially about the head and throat, which promotes the running at the noſtrils, will anſwer the moſt ſudden colds; and when the horſe feeds heartily, and ſnorts after coughing, moderate exerciſe every day will haſten his recovery.

To a horſe loaded with fleſh, a rowel may ſometimes be neceſſary, as may alſo a gentle purge or two to ſome, when the diſtemper is gone off.

Sect. IV. *Of Fevers in general.*

1. The ſymptoms of a fever are, Great reſtleſſneſs; the horſe ranging from one end of his rack to the other; his flanks beat; his eyes are red and inflamed; his tongue parched and dry; his breath is hot, and ſmells ſtrong; he loſes his appetite, and nibbles his hay, but does not chew it, and is frequently ſmelling to the ground; the whole body is hotter than ordinary, (though not parched, as in ſome inflammatory diſorders;) he dungs often, little at a time, uſually hard, and in ſmall bits; he ſometimes ſtales with difficulty, and his urine is high-coloured; and he ſeems to thirſt, but drinks little at a time, and often; his pulſe beats full and hard, to fifty ſtrokes and upwards in a minute.

The firſt intention of cure is bleeding, to the quantity of two or three quarts, if the horſe is ſtrong and in good condition: then give him a pint of the following drink, four times a-day; or an ounce of nitre, mixed up into a ball with honey, may be given thrice a-day, inſtead of the drink, and waſhed down with three or four horns of any ſmall liquor.

> Take of baum, ſage, and camomile-flowers, each a handful, liquorice-root ſliced half an ounce, ſalt prunel or nitre three ounces; infuſe in two quarts of boiling water; when cold, ſtrain off, and ſqueeze into it the juice of two or three lemons, and ſweeten with honey.

As the chief ingredient to be depended on in this drink is the nitre, it may perhaps be as well given in water alone; but as a horſe's ſtomach is ſoon palled, and he requires palatable medicines, the other ingredients may in that reſpect have their uſe. Soleyſel for this purpoſe adviſes two ounces of ſalt of tartar, and one of ſal armoniac, to be diſſolved in two quarts of water, and mixed with a pail of common water, adding a handful of bran or barley-flour to qualify the unpleaſant taſte: this may be given every day, and is a uſeful medicine.

His diet ſhould be ſcalded bran, given in ſmall quantities; which if he refuſes, let him have dry bran ſprinkled with water: put a handful of picked hay into the rack, which a horſe will often eat when he will touch nothing elſe; his water need not be much warmed, but ſhould be given often and in ſmall quantities: his cloathing ſhould be moderate; too much heat and weight on a horſe being improper in a fever, which ſcarce ever goes off in critical ſweats (as thoſe in the human body terminate), but by ſtrong perſpiration.

If in a day or two he begins to eat his bran and pick a little hay, this method with good nurſing will anſwer: but if he refuſes to feed, more blood ſhould be taken away, and the drinks continued; to which may be added two or three drams of ſaffron, avoiding at this time all hotter medicines: the following glyſter ſhould be given, which may be repeated every day, eſpecially if his dung is knotty or dry.

> Take two handfuls of marſhmallows, and one of camomile flowers; fennel-ſeed an ounce; boil in three quarts of water to two; ſtrain off, and add four ounces of treacle, and a pint of linſeed oil or any common oil.

Two quarts of water-gruel, fat broth, or pot-liquor, with the treacle and oil, will anſwer this purpoſe; to which may be added a handful of ſalt. Theſe ſort of glyſters are more proper than thoſe with purging ingredients.

The following opening drink is very effectual in thoſe fevers; and may be given every other day, when the glyſters ſhould be omitted; but the nitre-balls or drink may be continued, except on thoſe days theſe are taken.

> Take of cream of tartar and Glauber's ſalts, each four ounces; diſſolve in barley-water, or any other liquor: an ounce or two of lenitive electuary may be added, or a dram or two of powder of jalap, to quicken the operation in ſome horſes.

Four ounces of Glauber's ſalts, or cream of tartar, with the ſame quantity of lenitive electuary, may be given for the ſame purpoſe, if the former ſhould not open the body ſufficiently.

In four or five days the horſe generally begins to pick his hay, and has a ſeeming reliſh to food; though his flanks will heave pretty much for a fortnight: yet the temper of his body and return of appetite ſhew, that nothing more is requiſite to complete his recovery, than walking him abroad in the air, and allowing plenty of clean litter to reſt him in the ſtable.

This method of treating a fever is ſimple, according to the laws of nature; and is confirmed by long experience to be infinitely preferable to the hot method.

The intention here is to leſſen the quantity of blood, promote the ſecretion of urine and perſpiration, and cool and dilute the fluids in general.

2. There is another ſort of fever that horſes are ſubject to, of a more complicated and irregular nature than the former; which, if not properly treated, often proves fatal.

The ſigns are, A ſlow fever, with languiſhing, and great depreſſions: the horſe is ſometimes inwardly hot, and outwardly cold; at other times hot all over, but not to any extreme; his eyes look moiſt and languid; he has a continual moiſture in his mouth, which is the reaſon he ſeldom cares to drink, and when he does it is but little at a time. He feeds but little, and leaves off as ſoon as he has eat a mouthful or two; he moves his jaws in a feeble, looſe manner, with an unpleaſant grating of his teeth; his body is commonly open; his dung ſoft and moiſt, but ſeldom greaſy; his ſtaling is often irregular, ſometimes little, at other times profuſe, ſeldom high-coloured, but rather pale, with little or no ſediment.

When a horſe's appetite declines daily, till he refuſes all meat, it is a bad ſign. When the fever doth not diminiſh, or keep at a ſtand, but increaſes, the caſe is then dangerous. But when it ſenſibly abates, and his mouth grows drier, the grating of his teeth ceaſes, his appetite mends, and he takes to lay down (which perhaps he has not done for a fortnight), theſe are promiſing ſigns. A horſe in theſe fevers always runs at the noſe, but not the kindly white diſcharge, as in the breaking of a cold, but of a reddiſh or greeniſh duſky colour, and of a conſiſtence like glue, and ſticks like turpentine to the hair on the inſide of the noſtrils: If this turns to a gleet of clear thin water, the horſe's hide keeps open, and he mends in his appetite; theſe are certain ſigns of recovery.

The various and irregular ſymptoms that attend this ſlow fever, require great ſkill to direct the cure, and more knowledge of the ſymptoms of horſes diſeaſes than the generality of gentlemen are acquainted with. The experienced farrier ſhould therefore be conſulted and attended to, in regard to the ſymptoms; but very ſeldom as to the application of the remedy, which is generally above their comprehenſion; though it may be readily ſelected, by duly attending to the obſervations here inculcated.

Firſt, then, a moderate quantity of blood, not exceeding three pints, may be taken away, and repeated in proportion to his ſtrength, fullneſs, inward ſoreneſs, cough, or any tendency to inflammation. After this, the fever-drink firſt above mentioned may be given, with the addition of an ounce of ſnake-root, and three drams of ſaffron and camphor diſſolved firſt in a little ſpirit of wine; the quantity of the nitre may be leſſened, and theſe increaſed as the ſymptoms indicate.

The diet ſhould be regular; no oats given, but ſcalded or raw bran ſprinkled; the beſt flavoured hay ſhould be given by handfuls, and often by hand, as the horſe ſometimes cannot lift up his head to the rack.

As drinking is ſo abſolutely neceſſary to dilute the blood, if the horſe refuſes to drink freely of warm water or gruel, he muſt be indulged with having the chill only taken off by ſtanding in the ſtable: nor will any inconvenience enſue, but oftener an advantage; for the nauſeous warmth of water, forced on horſes for a time, palls their ſtomachs, and takes away their appetites, which the cold water generally reſtores.

Should the fever after this treatment increaſe, the horſe feed little, ſtale often, his urine being thin and pale, and his dung ſometimes looſe and at other times hard; ſhould the moiſture in his mouth continue, his ſkin being ſometimes dry and at others moiſt, with his coat looking ſtarting, and ſurfeited: upon theſe irregular ſymptoms, which denote great danger, give the following balls, or drink; for in theſe caſes there is no time to be loſt.

> Take of contrayerva-root, myrrh, and ſnake-root, powdered, each two drams, ſaffron one dram, mithridate or Venice treacle half an ounce; make into a ball with honey, which ſhould be given twice or thrice a-day, with two or three horns of an infuſion of ſnake-root ſweetened with honey; to a pint and a half of which may be added half a pint of treacle-water or vinegar, which latter is a medicine of excellent uſe in all kinds of inflammatory and putrid diſorders, either external or internal.

Should theſe balls not prove ſucceſsful, add to each a dram of camphor, and, where it can be afforded, to a horſe of value, the ſame quantity of caſtor. Or the following drink may be ſubſtituted in their ſtead for ſome days.

> Take of contrayerva and ſnake-root of each two ounces, liquorice-root ſliced one ounce, ſaffron two drams; infuſe in two quarts of boiling water cloſe covered for two hours; ſtrain off, and add half a pint of diſtilled vinegar, four ounces of ſpirit of wine, wherein half an ounce of camphor is diſſolved, and two ounces of mithridate or Venice treacle; give a pint of this drink every four, ſix, or eight hours.

Should the horſe be coſtive, recourſe muſt be had to glyſters, or the opening drink: ſhould he purge, take care not to ſuppreſs it, if moderate; but if, by continuance, the horſe grows feeble, add diaſcordium to his drinks, inſtead of the mithridate; if it increaſes, give more potent remedies.

Let it be remembered, that camphor is a very powerful and effectual medicine in theſe kinds of putrid fevers; being both active and attenuating, and particularly calculated to promote the ſecretions of urine and perſpiration.

Regard ſhould alſo be had to his ſtaling; which if in too great quantities, ſo as manifeſtly to depreſs his ſpirits, ſhould be controuled by proper reſtringents, or by preparing his drinks with lime-water. If, on the contrary, it happens that he is too remiſs this way, and ſtales ſo little as to occaſion a fullneſs and ſwelling of the body and legs, recourſe may be had to the following drink:

> Take of ſalt prunella, or nitre, one ounce; juniper-berries, and Venice turpentine, of each half an ounce: make into a ball with oil of amber.

Give him two or three of theſe balls, at proper intervals, with a decoction of marſh-mallows ſweetened with honey.

But if, notwithſtanding the method we have laid down, a greeniſh or reddiſh gleet is diſcharged from his noſtrils, with a frequent ſneezing; if he continues to loſe his fleſh, and becomes hide-bound; if he altogether forſakes his meat, and daily grows weaker; if he ſwells about the joints, and his eyes look fixed and dead; if the kernels under his jaws ſwell, and feel looſe; if his tail is raiſed, and quivers; if his breath ſmells ſtrong, and a purging enſues with a diſcharge of fetid dark-coloured matter; his caſe may then be looked on as deſperate, and all future attempts to ſave him will be fruitleſs.

The ſigns of a horſe's recovery are known by his hide keeping open, and his ſkin feeling kindly; his ears and feet will be of a moderate warmth, and his eyes briſk and lively; his noſe grows clean and dry; his appetite mends, he lies down well, and both ſtales and dungs regularly.

Be careful not to overfeed him on his recovery; let his diet be light, feeds ſmall, and increaſed by degrees as he gets ſtrength: for, by overfeeding, horſes have frequent relapſes or great ſurfeits, which are always difficult of cure.

If this fever ſhould be brought to intermit, or prove of the intermitting kind, immediately after the fit is over give an ounce of Jeſuit's bark, and repeat it every ſix hours till the horſe has taken four or ſix ounces: ſhould eruptions or ſwellings appear, they ought to be encouraged; for they are good ſymptoms at the decline of a fever, denote a termination of the diſtemper, and that no further medicines are wanted.

The true reaſons, perhaps, why ſo many horſes miſcarry in fevers, are, that their maſters, or doctors, will not

Of Fevers.

not wait with patience, and let nature have fair play: that they generally neglect bleeding ſufficiently at firſt; and are conſtantly forcing down ſugar-ſops, or other food, in a horn, as if a horſe muſt be ſtarved in a few days if he did not eat: then they ply him twice or thrice a-day with hot medicines and ſpirituous drinks, which (excepting a very few caſes) muſt be extremely pernicious to a horſe, whoſe diet is naturally ſimple, and whoſe ſtomach and blood, unaccuſtomed to ſuch heating medicines, muſt be greatly injured, and without doubt are often inflamed by ſuch treatment.

Dilute the blood with plenty of water, or white drink; let his diet be warm bran-maſhes, and his hay ſprinkled. Should the fever riſe, which will be known by the ſymptoms above deſcribed, give him an ounce of nitre thrice a-day in his water, or made up in a ball with honey. Let his body be kept cool and open, with the opening drink, given twice or thrice a-week; or an ounce of ſalt of tartar may be given every day, diſſolved in his water, for that purpoſe, omitting then the nitre. After a week's treatment in this manner, the cordial ball may be given once or twice a-day, with an infuſion of liquorice-root ſweetened with honey; to which may be added, when the phlegm is tough, or cough dry and huſky, a quarter of a pint of linſeed or ſallad oil, and the ſame quantity of oxymel ſquills.

The following cooling purge is very proper to give at the decline of the diſtemper, and may be repeated three or four times.

> Take two ounces of ſenna, anniſeed and fennel bruiſed each half an ounce: ſalt of tartar three drams; let them infuſe two hours in a pint of boiling water; ſtrain off, and diſſolve in it three ounces of Glauber's ſalt, and two of cream of tartar; give for a doſe in the morning.

This purge generally works before night very gently; and in fevers, and all inflammatory diſorders, is infinitely preferable to any other phyſic.

Before we cloſe this ſection on fevers, it may be no improper hint to the curious, to take notice, that a horſe's pulſe ſhould more particularly be attended to than is cuſtomary, as a proper eſtimate may thereby be made both of the degree and violence of the fever preſent, by obſerving the rapidity of the blood's motion, and the force that the heart and arteries labour with to propel it round. The higheſt calculation that has been made of the quickneſs of the pulſe in a healthy horſe, is, that it beats about forty ſtrokes in a minute; ſo that in proportion to the increaſe above this number, the fever is riſing, and if farther increaſed to above fifty the fever is very high.

How often the pulſe beats in a minute may eaſily be diſcovered by meaſuring the time with a ſtop-watch, or minute ſand-glaſs, while your hand is laid on the horſe's near ſide, or your fingers on any artery: thoſe which run up on each ſide the neck are generally to be ſeen beating, as well as felt, a little above the cheſt; and one withinſide each leg may be traced with the finger.

A due attention to the pulſe is ſo important an article, in order to form a proper judgment in fevers, that it would appear amazing it has ſo much been neglected, if one did not recollect, that the generality of farriers are ſo egregiouſly ignorant, that they have no manner of conception of the blood's circulation, nor in general have they ability enough to diſtinguiſh the difference between an artery and a vein.—With ſuch pretty guardians do we intruſt the healths and lives of the moſt valuable of animals!

Of a Pleuriſy, &c.

Sect. V. *Of a Pleuriſy, and an Inflammation of the Lungs, &c.*

1. These diſorders have ſcarce been mentioned by any writer on farriery before Mr Gibſon; who, by frequently examining the carcaſes of dead horſes, found them ſubject to the different kinds of inflammatious here deſcribed.

In order to diſtinguiſh theſe diſorders from others, we ſhall deſcribe the ſymptoms in Mr Gibſon's own words.

"A pleuriſy then, which is an inflammation of the pleura; and a peripneumony, which is an inflammation of the lungs; have ſymptoms very much alike; with this difference only, that in a pleuriſy a horſe ſhews great uneaſineſs, and ſhifts about from place to place; the fever, which at firſt is moderate, riſes ſuddenly very high; in the beginning he often ſtrives to lie down, but ſtarts up again immediately, and frequently turns his head towards the affected ſide, which has cauſed many to miſtake a pleuritic diſorder for the gripes, this ſign being common to both, though with this difference: in the gripes, a horſe frequently lies down and rolls; and, when they are violent, he will alſo have convulſive twitches, his eyes being turned up, and his limbs ſtretched out, as if he were dying; his ears and feet are ſometimes occaſionally hot, and ſometimes as cold as ice; he falls into profuſe ſweats, and then into cold damps; ſtrives often to ſtale and dung, but with great pain and difficulty; which ſymptoms generally continue, till he has ſome relief: but, in a pleuriſy, a horſe's ears and feet are always burning hot, his mouth parched and dry, his pulſe hard and quick: even ſometimes, when he is nigh dying, his fever is continued and increaſing; and though in the beginning he makes many motions to lie down, yet afterwards he reins back as far as his collar will permit, and makes not the leaſt offer to change his poſture, but ſtands panting with ſhort ſtops, and a diſpoſition to cough, till he has relief, or drops down.

"In an inflammation of the lungs, ſeveral of the ſymptoms are the ſame; only in the beginning he is leſs active, and never offers to lie down during the whole time of his ſickneſs; his fever is ſtrong, breathing difficult, and attended with a ſhort cough: and whereas, in a pleuriſy, a horſe's mouth is generally parched and dry; in an inflammation of the lungs, when a horſe's mouth is open, a ropy ſlime will run out in abundance; he gleets alſo at the noſe a reddiſh or yellowiſh water, which ſticks like glue to the inſide of his noſtrils.

"In a pleuriſy, a horſe heaves and works violently at his flanks, with great reſtleſſneſs, and for the moſt part his belly is tucked up: but, in an inflammation of the lungs, he always ſhews fullneſs; the working of his flanks is regular, except after drinking and ſhifting his poſture; and his ears and feet are for the moſt part cold, and often in damp ſweets".

2. The cure of both theſe diſorders is the ſame. In the beginning a ſtrong horſe may loſe three quarts of blood, the next day two quarts more; and, if ſymptoms do not abate, the bleedings muſt be repeated, a

Of a Pleuriſy, &c.

quart at a time; for it is ſpeedy, large, and quick-repeated bleedings that are in theſe caſes chiefly to be depended on. But if a horſe has had any previous weakneſs, or is old, you muſt bleed him in leſs quantities, and oftener. Mr Gibſon recommends rowels on each ſide the breaſt, and one on the belly; and a bliſtering ointment to be rubbed all over his briſket upon the foremoſt ribs.

The diet and medicines ſhould be both cooling, attenuating, relaxing, and diluting; and the horſe ſhould have warm maſhes and plenty of water or gruel. The following balls may be given thrice a-day.

TAKE of ſpermaceti and nitre, of each one ounce; oil of anniſeed, 30 drops; honey enough to make a ball.

A pint of barley-water, in which figs and liquorice-root have been boiled, ſhould be given after each ball; to which the juice of lemons may be added; and if the lungs are greatly oppreſſed with a dry ſhort cough, two or three horns full of the decoction may be given three or four times a-day, with four ſpoonfuls of honey and linſeed oil. A ſtrong decoction of the rattle-ſnake-root is alſo much recommended in pleuritic diſorders, and may be given to the quantity of two quarts a-day, ſweetened with honey. It remarkably attenuates the blood, diſperſes the inflammation, and in ſome parts is deemed a ſpecific for this complaint.

An emollient glyſter ſhould be injected once a-day, to which may be added two ounces of nitre or cream of tartar.

In two or three days he will probably run at the noſe, and begin to feed; but ſhould he not, and continue hot and ſhort-breathed, you muſt bleed him again, and give the following glyſter.

TAKE ſenna and marſhmallows, of each two ounces; fennel and bay-berries, each one ounce; boil in five pints of clear water, to two quarts; pour off the clear, and add four ounces of purging ſalts, two or three of ſyrup of buckthorn, and half a pint of linſeed or any common oil.

If by theſe means he grows cooler, and his pain moderates, repeat the glyſter the next day, unleſs it worked too much; then intermit a day; and when he comes to eat ſcalded bran and picked hay, leave off the balls, and continue only the decoction, with now and then a glyſter.

But let it be obſerved, that a horſe ſeldom gets the better of theſe diſorders, unleſs he has relief in a few days; for if the inflammation is not checked in that time, it uſually terminates in a gangrene, or collection of matter, which, for want of expectoration, ſoon ſuffocates him.

But as pleuritic diſorders are apt to leave a taint on the lungs, great care ſhould be taken of the horſe's exerciſe and feeding, which ſhould be light and open for two or three weeks.

There is alſo an external pleuriſy, or inflammation of the muſcles between the ribs, which, when not properly treated, proves the foundation of that diſorder called the *cheſt-founder;* for if the inflammation is not diſperſed in time, and the viſcid blood and juices ſo attenuated by internal medicines that a free circulation is obtained, ſuch a ſtiffneſs and inactivity will remain on theſe parts, as will not eaſily be removed, and which is generally known by the name of *cheſt-founder*.

Of Coughs, &c.

The ſigns of this inflammation, or external pleuriſy, are a ſtiffneſs of the body, ſhoulders, and fore-legs; attended ſometimes with a ſhort dry cough, and a ſhrinking when handled in thoſe parts.

Bleeding, ſoft pectorals, attenuants, and gentle purges, are the internal remedies; and, externally, the parts affected may be bathed with equal parts of ſpirit of ſal armoniac and ointment of marſhmallows or oil of camomile.

Theſe outward inflammations frequently fall into the inſide of the fore-leg, and ſometimes near the ſhoulder; forming abſceſſes, which terminate the diſorder.

The membrane which ſeparates the lungs, and more particularly the diaphragm or midriff, is often alſo inflamed; which is ſcarce to be diſtinguiſhed from the pleuriſy, only in this, that when the midriff is greatly inflamed, the horſe will ſometimes be jaw-ſet, and his mouth ſo much cloſed that nothing can be got in; but the method of cure is the ſame.

SECT. VI. *Of a Cough, and Aſthma.*

THE conſequence often of the preceding diſorders injudiciouſly treated, are ſettled habitual coughs; which frequently degenerate into aſthmas and broken-wind.

Nothing has more perplexed practitioners than the cure of ſettled coughs; the cauſe of which, perhaps, has been their want of attention to the different ſymptoms which diſtinguiſh one cough from another; for without ſtrict obſervance thereof, it is impoſſible to find out the true method of cure.

Thus, if a horſe's cough is of long ſtanding, attended with loſs of appetite, waſting of fleſh, and weakneſs, it denotes a conſumption; and that the lungs are full of knotty, hard ſubſtances, called tubercles, which have often been diſcovered on diſſection.

The following ſigns denote when the cough proceeds from phlegm and ſlimy matter that ſtop up the veſſels of the lungs.

The horſe's flanks have a ſudden quick motion; he breathes thick, but not with his noſtrils open like a horſe in a fever or that is broken-winded; his cough is ſometimes dry and huſky, ſometimes moiſt, before which he wheezes, rattles in the throat, and ſometimes throws out of his noſe and mouth great gobs of white phlegm, eſpecially after drinking, or when he begins or ends his exerciſe, which diſcharge commonly gives great relief. Some ſuch horſes wheeze and rattle to ſuch a degree, and are ſo thick-winded, that they can ſcarce move on, till they have been out ſome time in the air; though then they will perform beyond expectation.

The above aſthmatic caſe proves often very obſtinate; but, if it happens to a young horſe, and the cough is not of long ſtanding, it is greatly relieved, if not totally cured, by the following method.

If the horſe is full of fleſh, bleed him plentifully; if low in fleſh, more ſparingly; which may occaſionally be repeated, on very great oppreſſions and difficulty of breathing, in proportionate quantities.

As mercurial medicines are found remarkably uſeful in theſe caſes, give a mercurial ball (with two drams of calomel) over night, and a common purge next morning: or the following, which is recommended by Mr Gibſon.

TAKE gum-galbanum, ammoniacum, and aſa fœtida, of each two drams, fine aloes one ounce, ſaffron one dram, oil of anniſeeds two drams, oil of amber one dram; with honey enough to form into a ball.

They may be repeated at proper intervals, with the uſual cautions. In the intermediate days, and for ſome time after, one of the following balls may be given every morning.

Take cinnabar of antimony, finely levigated, ſix ounces; gum ammoniacum, galbanum, and aſa fætida, of each two ounces; garlick four ounces; ſaffron half an ounce: make into a paſte for balls, with a proper quantity of honey.

Take of the pectoral or cordial ball one pound, balſam of Peru half an ounce, balſam of ſulphur anniſated one ounce, flowers of benjamin half an ounce, honey as much as is ſufficient to form them into a paſte; give the ſize of a pigeon's egg every morning.

Exerciſe in a free open air is very ſerviceable, and the diet ſhould be moderate.

The following are the ſymptoms of a dry cough, or aſthma.

The horſe afflicted with this cough eats heartily, hunts and goes through his buſineſs with alacrity, appears well coated, and has all the ſigns of perfect health; yet he coughs at particular times almoſt inceſſantly, without throwing up any thing, except that the violence of the cough will cauſe a little clear water to diſtil from his noſe. Though this cough is not periodical, yet ſome of theſe horſes cough moſt in a morning, after drinking.

This may properly be ſtyled a *nervous aſthma* in a horſe, as probably it chiefly affects the nerves in the membranous parts of the lungs and midriff; and is a caſe very doubtful at leaſt, if not incurable: but when the horſe is young, the following method may be ſucceſsful.

Take away firſt a moderate quantity of blood; then give him two drams of calomel, mixed up with an ounce of diapente, for two nights; and the next morning a purging ball. Keep him well cloathed and littered, and feed him with ſcalded bran and warm water.

Once in eight or ten days this purge may be repeated, with one mercurial ball only, given over night.

The following balls may then be taken, one every day, about the ſize of a pullet's egg, the horſe faſting two hours afterwards; and ſhould be continued two months or longer, to be of real ſervice.

Take native cinnabar, or cinnabar of antimony, half a pound; gum guaiacum four ounces; myrrh, and gum armoniac, of each two ounces; Venice ſoap half a pound: the cinnabar muſt be finely levigated, as before obſerved, and the whole mixed up with honey, or oxymel ſquills.

The following alſo will be found a uſeful remedy in obſtinate dry coughs.

Take gum ammoniacum, ſquills, and Venice ſoap, of each four ounces; balſam of ſulphur with anniſeeds one ounce; beat up into a maſs, and give as the former.

Before we cloſe this ſection, it may be neceſſary to obſerve here, that ſome young horſes are ſubject to coughs on cutting their teeth; their eyes alſo are affected from the ſame cauſe. In theſe caſes, always bleed; and if the cough is obſtinate, repeat it, and give warm maſhes; which, in general, are alone ſufficient to remove this complaint.

Sect. VII. *Of a Broken Wind.*

This diſorder hitherto ſeems to have been little underſtood; but Mr Gibſon is inclined to think, that the ſource of it is frequently owing to injudicious or haſty feeding of young horſes for ſale; by which means the growth of the lungs, and all the contents within the cheſt, are ſo increaſed, and in a few years ſo preternaturally enlarged, that the cavity of the cheſt is not capacious enough for them to expand themſelves in and perform their functions.

A narrow contracted cheſt with large lungs may ſometimes naturally be the cauſe of this diſorder: and it has been obſerved, that horſes riſing eight years old are as liable to this diſtemper, as, at a certain period of life, men are to fall into aſthmas, conſumptions, and chronic diſeaſes.

The reaſon why this diſorder becomes more apparent at this age, may be, that a horſe comes to his full ſtrength and maturity at this time; at ſix, he commonly finiſhes his growth in height; after that time he lets down his belly and ſpreads, and all his parts are grown to their full extent; ſo that the preſſure on the lungs and midriff is now more increaſed.

But how little weight ſoever theſe reaſons may have, repeated diſſections have given ocular proofs of a preternatural largeneſs, not only of the lungs of broken-winded horſes, but of their heart and its bag, and of the membrane which divides the cheſt; as well as of a remarkable thinneſs in the diaphragm, or midriff.

This diſproportion has been obſerved to be ſo great, that the heart and lungs have been almoſt of twice their natural ſize, perfectly ſound, and without any ulceration whatever, or any defect in the wind-pipe or its glands.

Hence it appears, that this enormous ſize of the lungs, and the ſpace they occupy, by hindering the free action of the midriff, is the chief cauſe of this diſorder: and as the ſubſtance of the lungs was found more fleſhy than uſual, they of courſe muſt loſe a great deal of their ſpring and tone.

Whoever conſiders a broken-wind in this light, muſt own that it may be reckoned among the incurable diſtempers of horſes; and that all the boaſted pretenſions to cure are vain and frivolous, ſince the utmoſt ſkill can amount to no more than now and then palliating the ſymptoms, and mitigating their violence.

We ſhall therefore only lay down ſuch methods as may probably prevent this diſorder, when purſued in time. But if they ſhould not ſucceed, we ſhall offer ſome remedies and rules to mitigate its force, and make a horſe as uſeful as poſſible under this malady.

It is uſual, before a broken wind appears, for a horſe to have a dry obſtinate cough, without any viſible ſickneſs or loſs of appetite; but, on the contrary, a diſpoſition to foul feeding, eating the litter, and drinking much water.

In order then to prevent, as much as poſſible, this diſorder, bleed him, and give him the mercurial phyſic above preſcribed, which ſhould be repeated two or three times.

The following balls are then to be taken for ſome time, which have been found extremely efficacious in

Of a Broken-Wind.

removing obſtinate coughs.

Take aurum moſaicum, finely powdered, eight ounces; myrrh and elicampane, powdered, each four ounces; anniſeeds and bay-berries, each an ounce; ſaffron, half an ounce; make into balls with oxymel ſquills.

The aurum moſaicum is made of equal parts of quickſilver, tin, ſal armoniac, and ſulphur. We give this medicine as ſtrongly recommended by Mr Gibſon; but how far the aurum moſaicum may contribute to its efficacy, may perhaps juſtly be diſputed: as a ſubſtitute in its room, therefore, for this purpoſe, we recommend the ſame quantity of powdered ſquills, or gum ammoniacum, or equal parts of each.

Broken-winded horſes ſhould eat ſparingly of hay, which as well as their corn may be wetted with chamber ley, or fair water; as this will make them leſs craving after water.

The volatile ſalts in the urine may make it preferable to water, and may be the reaſon why garlick is found ſo efficacious in theſe caſes; two or three cloves given at a time in a feed, or three ounces of garlick bruiſed, and boiled in a quart of milk and water, and given every other morning for a fortnight, having been found very ſerviceable; for by warming and ſtimulating the ſolids, and diſſolving the tenacious juices which choke up the veſſels of the lungs, theſe complaints are greatly relieved.

Careful feeding, and moderate exerciſe, has greatly relieved broken-winded horſes.

Horſes ſent to graſs in order to be cured of an obſtinate cough, have often returned completely broken-winded, where the paſture has been rich and ſucculent, ſo that they have had their bellies conſtantly full. As the ill conſequence therefore is obvious, where you have not the conveniency of turning out your horſe for a conſtancy, you may ſoil him for a month or two with young green barley, tares, or any other young herbage.

To purſive thick-winded horſes, Barbadoes and common tar have often been given with ſucceſs to the quantity of two ſpoonfuls mixed with the yolk of an egg, diſſolved in warm ale, and given faſting two or three times a-week, eſpecially thoſe days you hunt or travel.

But in order to make all theſe ſorts of horſes of any real ſervice to you, the grand point is to have a particular regard to their diet, obſerving a juſt œconomy both in that and their exerciſe; giving but a moderate quantity of hay, corn, or water, at a time, and moiſtening the former, to prevent their requiring too much of the latter, and never exerciſing them but with moderation, as has before been obſerved. The following alterative ball may be given once a-fortnight or three weeks; and as it operates very gently, and requires no confinement but on thoſe days it is given (when warm meat and water are neceſſary), it may be continued for two or three months.

Take ſocotorine aloes ſix drams; myrrh, galbanum, and ammoniacum, of each two drams; bay-berries half an ounce: make into a ball with a ſpoonful of oil of amber, and a ſufficient quantity of ſyrup of buckthorn.

Sect. VIII. *Of a Conſumption.*

When a conſumption proceeds from a defect in a horſe's lungs or any principal bowel, the eyes look dull; the ears and feet are moſtly hot; he coughs ſharply by fits; ſneezes much, and frequently groans with it; his flanks have a quick motion; he gleets often at the noſe, and ſometimes throws out a yellowiſh curdled matter; and he has little appetite to hay, but will eat corn, after which he generally grows hot.

Of a Conſumption, &c.

As to the cure, one of the principal things is bleeding in ſmall quantities (a pint, or pint and half, from ſome horſes is ſufficient), which ſhould be repeated as often as the breath is more than ordinarily oppreſſed. Pectorals may be given to palliate preſent ſymptoms; but as diſſections have diſcovered both the glands of the lungs and meſentery to be ſwelled, and often indurated, the whole ſtreſs lies on mercurial purges, and the following ponderous alteratives, given intermediately.

Take native cinnabar, or cinnabar of antimony, one pound, powdered very fine, and add the ſame quantity of gum guaiacum and nitre; give the horſe an ounce of this powder twice a-day, wetting his feeds.

The ſpring graſs is often extremely ſerviceable; but the ſalt marſhes are to be preferred, and to be more depended on than medicines; for great alterations are thereby made in the blood and juices, and no ſmall benefit ariſes from open air and proper exerciſe.

Sect. IX. *Of an Apoplexy or Staggers, Convulſive Diſorders, Lethargy, Epilepſy, and Palſy.*

Farriers generally include all diſtempers of the head under two denominations, viz. *ſtaggers* and *convulſions*, wherein they always ſuppoſe the head primarily affected. But in treating theſe diſorders, we will diſtinguiſh between thoſe that are peculiar to the head, as having their ſource originally thence; and thoſe that are only concomitants of ſome other diſeaſe.

In an apoplexy a horſe drops down ſuddenly, without other ſenſe or motion than a working at his flanks.

The previous ſymptoms are, drowſineſs; watery eyes, ſomewhat full and inflamed; a diſpoſition to reel; feebleneſs; a bad appetite; the head almoſt conſtantly hanging, or reſting on the manger; ſometimes with little or no fever, and ſcarce any alteration in the dung or urine; the horſe is ſometimes diſpoſed to rear up, and apt to fall back when handled about the head; which is often the caſe with young horſes, to which it does not ſuddenly prove mortal, but with proper help they may ſometimes recover. If the apoplexy proceeds from wounds or blows on the head, or matter on the brain; beſides the above ſymptoms, the horſe will be frantic by fits, eſpecially after his feeds, ſo as to ſtart and fly at every thing. Theſe caſes ſeldom admit of a perfect recovery; and when horſes fall down ſuddenly, and work violently at their flanks, without any ability to riſe after a plentiful bleeding, they ſeldom recover.

All that can be done is to empty the veſſels as ſpeedily as poſſible, by ſtriking the veins in ſeveral parts at once, bleeding to four or five quarts; and to raiſe up the horſe's head and ſhoulders, ſupporting them with plenty of ſtraw. If he ſurvives the fit, cut ſeveral rowels; give him night and morning glyſters prepared with a ſtrong decoction of ſenna and ſalt, or the purging glyſter mentioned in the directions; blow once a-day up his noſtrils a dram of powder of aſarabacca, which will promote a great diſcharge; afterwards two

Of an Apoplexy, &c.

or three aloetic purges ſhould be given; and to ſecure him from a relapſe, by attenuating and thinning his blood, give him an ounce of equal parts of antimony and crocus metallorum for a month; or, which is preferable, the ſame quantity of cinnabar of antimony and gum guaiacum.

If the fit proceeds only from fulneſs of blood, high feeding, and want of ſufficient exerciſe, or a ſizy blood (which is often the caſe with young horſes, who though they reel, ſtagger, and ſometimes ſuddenly fall down, yet are eaſily cured by the above method), an opening diet with ſcalded bran and barley will be neceſſary for ſome time; and the bleeding may be repeated in ſmall quantities.

As to the other diſorders of the head, ſuch as lethargy or ſleeping evil, epilepſy or falling-ſickneſs, vertigo, frenzy, and madneſs, convulſions, and paralytical diſorders, as they are moſt of them to be treated as the apoplexy and epilepſy, by bleeding and evacuations, with the alteratives there directed, we ſhall wave treating of them ſeparately; but mention ſome particular rules to diſtingiſh them, according to the plan we laid down; and then offer ſome general remedies for the ſeveral purpoſes.

In an epilepſy, or falling ſickneſs, the horſe reels and ſtaggers, his eyes are fixed in his head, he has no ſenſe of what he is doing, he ſtales and dungs inſenſibly, he runs round and falls ſuddenly; ſometimes he is immoveable, with his legs ſtretched out as if he was dead, except only a quick motion of his heart and lungs, which cauſes a violent working of his flanks; ſometimes he has involuntary motions, and ſhaking of his limbs, ſo ſtrong, that he has not only beat and ſpurned his litter, but the pavement with it; and with theſe alternate ſymptoms a horſe has continued more than three hours, and then has as ſurpriſingly recovered: at the going off of the fit, he generally foams at the mouth, the foam being white and dry, like what comes from a healthful horſe when he champs on the bit.

But in all kinds of gripes, whether they proceed from diſorders in the guts, or retention of urine, a horſe is often up and down, rolls and tumbles about; and when he goes to lie down, generally makes ſeveral motions with great ſeeming carefulneſs, which ſhews he has a ſenſe of his pain; and if he lays ſtretched out for any time, it is generally but for a ſhort ſpace.

Epilepſies and convulſions may ariſe from blows on the head, too violent exerciſe, and hard ſtraining; and from a fulneſs of blood, or impoveriſhed blood, and ſurfeits; which are ſome of the cauſes that denote the original diſorder.

In lethargic diſorders, the horſe generally reſts his head with his mouth in the manger, and his pole often reclined to one ſide; he will ſhew an inclination to eat, but generally falls aſleep with his food in his mouth, and he frequently ſwallows it whole without chewing: emollient glyſters are extremely neceſſary in this caſe, with the nervous balls recommended for the ſtaggers and convulſions; ſtrong purges are not requiſite, nor muſt you bleed in too large quantities, unleſs the horſe be young and luſty. In old horſes, rowels and large evacuations are improper; but volatiles of all kinds are of uſe, when they can be afforded: the alterative purge mentioned at the end of this ſection may be given, and repeated on amendment.

Of a Lethargy, &c.

This diſtemper is to be cured by theſe means, if the horſe is not old and paſt his vigour. It is a good ſign if he has a tolerable appetite, and drinks freely without ſlabbering, and if he lies down, and riſes up carefully, though it be but ſeldom.

But if a lethargic horſe does not lie down; if he is altogether ſtupid and careleſs, and takes no notice of any thing that comes near him; if he dungs and ſtales ſeldom, and even while he ſleeps and dozes; it is a bad ſign: if he runs at the noſe thick white matter, it may relieve him; but if a viſcid gleet, that ſticks to his noſtrils like glue, turn to a profuſe running of ropy, reddiſh and greeniſh matter, it is an infallible ſign of a great decay of nature, and that it will prove deadly.

Young horſes from four to ſix years, are very ſubject to convulſions, from botts in the ſpring; and the large coach breed, more then the ſaddle. They are ſeized without any previous notice; and if botts and worms are diſcovered in their dung, the cauſe ſeems to be out of doubt, more eſpecially if they have lately come out of a dealer's hands.

When this convulſion proceeds from a diſtemperature of the midriff, or any of the principal bowels, it is to be diſtinguiſhed from botts and vermin by previous ſymptoms; the horſe falls off his ſtomach, and grows gradually weak, feeble, and diſpirited in his work, and turns ſhort-breathed with the leaſt exerciſe.

The lively deſcription of that univerſal cramp or convulſion, called by ſome the *ſtag-evil*, which ſeizes all the muſcles of the body at once, and locks up the jaws, ſo that it is impoſſible almoſt to force them open, we ſhall give in Mr Gibſon's own words, who ſays: As ſoon as the horſe is ſeized, his head is raiſed with his noſe towards the rack, his ears pricked up, and his tail cocked, looking with eagerneſs as an hungry horſe when hay is put down to him, or like a high-ſpirited horſe when he is put upon his mettle; inſomuch, that thoſe who are ſtrangers to ſuch things, when they ſee a horſe ſtand in this manner, will ſcarce believe any thing of conſequence ails him; but they are ſoon convinced, when they ſee other ſymptoms come on apace, and that his neck grows ſtiff, cramped, and almoſt immoveable: and if a horſe in this condition lives a few days, ſeveral knots will ariſe on the tendinous parts thereof, and all the muſcles both before and behind will be ſo much pulled and cramped, and ſo ſtretched, that he looks as if he was nailed to the pavement, with his legs ſtiff, wide, and ſtradling; his ſkin is drawn ſo tight on all parts of the body, that it is almoſt impſſible to move it; and if trial be made to make him walk, he is ready to fall at every ſtep, unleſs he be carefully ſupported; his eyes are ſo fixed with the inaction of the muſcles, as give him a deadneſs in his looks; he ſnorts and ſneezes often, pants continually with ſhortneſs of breath; and this ſymptom increaſes continually till he drops down dead; which generally happens in a few days, unleſs ſome ſudden and very effectual turn can be given to the diſtemper.

In all theſe caſes the horſe ſhould firſt be bled plentifully, unleſs he is low in fleſh, old, or lately come off any hard continued duty; then you muſt be more ſparing of his blood: afterwards give the following ball.

TAKE aſa fetida half an ounce, Ruſſia caſtor powdered two drams, valerian root powdered one ounce; make into a ball with honey and oil of amber.

Of the Stag-evil, &c.

This ball may be given twice a-day at firſt; and then once, waſhed down with a decoction of miſletoe or valerian ſweetened with liquorice or honey: an ounce of aſa fœtida may be tied up in a piece of ſtrong coarſe linen rag, and put behind his grinders to champ on.

The laxative purges and emollient glyſters ſhould be given intermediately to keep the body open; but when the former balls have been taken a week or ten days, the following may be given once a-day with the valerian decoction.

TAKE cinnabar of antimony ſix drams; aſa fœtida half an ounce; ariſtolochia, myrrh, and bay-berries, of each two drams; make into a ball with treacle and oil of amber.

This is the moſt effectual method of treating theſe diſorders; but when they are ſuſpected to ariſe from botts, and worms, which is generally the caſe, mercurial medicines muſt lead the way, thus:

TAKE mercurius dulcis and philonium, of each half an ounce; make into a ball with conſerves of roſes, and give the horſe immediately; half the quantity may be repeated in four or five days.

The following infuſion ſhould then be given, to the quantity of three or four horns, three or four times a-day, till the ſymptoms abate; when the above nervous balls may be continued till they are removed.

TAKE penny-royal and rue of each two large handfuls, camomile flowers one handful, aſa fœtida and caſtor of each half an ounce, ſaffron and liquorice-root ſliced of each two drams; infuſe in two quarts of boiling water; pour off from the ingredients as wanted.

If the caſtor is omitted, add an ounce of aſa fœtida.

The following ointment may be rubbed into the cheeks, temples, neck, ſhoulders, ſpine of the back, and loins, and where-ever there is the greateſt contractions and ſtiffneſs.

TAKE nerve and marſhmallow ointment of each four ounces, oil of amber two ounces, with a ſufficient quantity of camphorate ſpirit of wine; make a liniment.

When the jaws are ſo locked up that medicines cannot be given by the mouth, it is more eligible to give them by way of glyſter: for forcing open the jaws by violence often puts a horſe into ſuch agonies, that the ſymptoms are thereby increaſed.

In this caſe alſo he muſt be ſupported by nouriſhing glyſters, made of milk-pottage, broths, *&c.* which muſt be given to the quantity of three or four quarts a-day: glyſters of this kind will be retained, and abſorbed into the blood; and there have been inſtances of horſes thus ſupported for three weeks together, who muſt otherwiſe have periſhed.

Mr Gibſon mentions ſome extraordinary inſtances of ſucceſs in caſes of this ſort by theſe methods, and repeated frictions, which are extremely ſerviceable in all convulſive diſorders, and often prevent their being jaw-ſet; they ſhould be applied with unwearied diligence every two or three hours, where-ever any ſtiffneſs or contractions in the muſcles appear; for a horſe in this condition never lies down till they are in ſome meaſure removed.

The uſe of rowels in theſe caſes is generally unſucceſsful, the ſkin being ſo tenſe and tight, that they ſeldom digeſt kindly, and ſometimes mortify; ſo that if they are applied they ſhould be put under the jaws, and in the breaſt.

Of the Strangles, &c.

The red-hot iron ſo frequently run through the foretop and mane, near the occipital bone, for this purpoſe, has often been found to have deſtroyed the cervical ligament.

In paralytic diſorders, where the uſe of a limb or limbs is taken away, the internals above recommended ſhould be given, in order to warm, invigorate, and attenuate the blood; and the following ſtimulating embrocation ſhould be rubbed into the parts affected.

TAKE oil of turpentine four ounces, nerve ointment and oil of bays of each two ounces, camphor rubbed fine one ounce, rectified oil of amber three ounces, tincture of cantharides one ounce.

With this liniment the parts affected ſhould be well bathed for a conſiderable time, to make it penetrate; and when the hind parts chiefly are lame, the back and loins ſhould be well rubbed with the ſame. To the nervous medicines above recommended, may be added ſnake-root, contrayerva, muſtard-ſeed, horſe-radiſh root ſteeped in ſtrong beer, or wine where it can be afforded. Take the following for an example, which may be given to the quantity of three pints a-day alone, or two horns full may taken after the nervous balls.

TAKE ſnake-root, contrayerva, and valerian, of each half an ounce; muſtard-ſeed and horſe-radiſh root ſcraped, of each two ounces; long pepper two drams: infuſe in three pints of ſtrong wine.

When the horſe is recovering from any of the above diſorders, the following alterative purge may be repeated two or three times, as it operates very gently.

TAKE ſocotorine aloes one ounce, myrrh half an ounce, aſa fœtida and gum ammoniacum of each two drams, ſaffron one dram; make into a ball with any ſyrup.

Where a retention of dung is the cauſe of this diſorder, the great gut ſhould firſt be raked thoroughly with a ſmall hand, after which plenty of emollient oily glyſters ſhould be thrown up, and the opening drink given, till the bowels are thoroughly emptied of their impriſoned dung. Their diet ſhould for ſome days be opening, and conſiſt chiefly of ſcalded bran, with flour of brimſtone, ſcalded barley, *&c.*

SECT. X. *Of the Strangles, and Vives.*

1. THE ſtrangles is a diſtemper to which colts and young horſes are very ſubject; and begins with a ſwelling between the jaw-bones, which ſometimes extends to the muſcles of the tongue; and is attended with ſo great heat, pain, and inflammation, that ſometimes, till matter is formed, the horſe ſwallows with the utmoſt difficulty.

The ſymptoms are, extraordinary heat and feveriſhneſs, with a painful cough, and a great inclination to drink without being able; ſome horſes loſing their appetite entirely, others eating but little, by reaſon of the pain which chewing and ſwallowing occaſions: when the ſwelling begins on the inſide of the jaw-bones, it is much longer in coming to matter than when more to the middle; when it ariſes among the glands, and divides into ſeveral tumours, the cure is generally tedious, as it breaks in different places; and when it forms upwards on the wind-pipe and gullet, there is ſometimes danger of ſuffocation, unleſs the ſwelling

Of the Vives.

ſoon breaks. But the moſt dangerous kind is, when, beſides the above ſymptoms, the horſe runs at the noſe; this is by ſome called the *baſtard ſtrangles*.

As this diſorder ſeems to be critical, the moſt approved method is to aſſiſt nature in bringing the ſwellings to maturity, by keeping them conſtantly moiſt with ointment of marſhmallows, and covering the head and neck with a warm hood. But as all ſwellings in glandular parts ſuppurate ſlowly, the following poultice may be applied hot twice a-day.

Take leaves of marſhmallows ten handfuls, white-lily root half a pound, linſeed and fenugreek-ſeed bruiſed of each four ounces: boil them in two quarts of water till the whole is pulpy; and add four ounces of ointment of marſhmallows, and a ſufficient quantity of hogs-lard, to prevent its growing ſtiff and dry.

In five or ſix days, by theſe means, the matter is generally formed, and makes its way through the ſkin; and if the diſcharge is made freely and with eaſe, the opening need not be enlarged; but ſhould be dreſſed with the following ointment ſpread on tow, ſtill continuing the poultice over it to promote the digeſtion, and prevent any remaining hardneſs.

Take roſin and Burgundy pitch of each a pound and a half, honey and common turpentine each eight ounces, yellow wax four ounces, hogs-lard one pound, verdigreaſe finely powdered one ounce; melt the ingredients together, but do not put in the verdigreaſe till removed from the fire; and it ſhould be ſtirred in by degrees, till the whole is grown ſtiff and cool.

If the fever and inflammation run high, and the ſwelling be ſo ſituated as to endanger ſuffocation, a moderate quantity of blood muſt be taken away, and the remainder diluted with plenty of water-gruel, or warm water, maſhes, *&c.*

The running at the noſe which often attends the ſtrangles is dangerous, eſpecially if it continues after they have ripened and broke, as the horſe will be greatly weakened thereby. To prevent this waſte and decay, give him every day for ſome time an ounce of Jeſuit's bark; or a ſtrong decoction of guaiacum ſhavings, which hath been found extremely beneficial in reſtraining theſe glandular diſcharges when too liberal, and in drying up ulcers of all kinds in horſes.

If a hardneſs remains after the ſores are healed up, they may be anointed with the mercurial ointment; and when the horſe has recovered his ſtrength, purging will be neceſſary.

2. The vives or ives differ from the ſtrangles only in this; that the ſwellings of the kernels under the ears of the horſe, (which are the parts at firſt chiefly affected), ſeldom gather, or come to matter, but by degrees perſpire off and diſperſe by warm cloathing, anointing with the marſhmallow ointment, and a moderate bleeding or two. But ſhould the inflammation continue notwithſtanding thoſe means, a ſuppuration muſt be promoted by the methods above recommended in the ſtrangles.

When theſe ſwellings appear in an old or full-aged horſe, they are ſigns of great malignity, and often of an inward decay, as well as forerunners of the glanders.

The mercurial ointment above-mentioned, may be prepared thus:

Take of crude mercury or quickſilver one ounce, Venice turpentine half an ounce; rub together in a mortar till the globules of the quickſilver are no longer viſible; then add two ounces of hogs-lard.

Diſeaſes of the Eyes.

Sect. XI. *Of the Diſeaſes of the Eyes.*

1. In order to make the diſorders of the eyes well underſtood, we ſhall conſider them as ariſing from different cauſes; external injuries affecting the globe of the eye; and from internal cauſes affecting the humours within the globe. We ſhall conſider alſo the eye as naturally weak from a bad conformation, which poſſibly may often be hereditary.

2. In all recent diſorders of the eye from external injuries, ſuch as blows, bites, *&c.* attended with a ſwelling of the lid, and a running from the eye, you muſt firſt ſponge the part often with cold ſpring-water and vinegar; and if much ſwelled, bleed immediately, and apply over it a poultice made of the pulps of roaſted or boiled apples, cleared from their ſeeds and huſks; or of conſerve of roſes and vinegar, with a little bole, and the white of an egg. When the ſwelling is abated, either of the following waſhes will complete the cure.

Take white vitriol half an ounce, ſugar of lead two drams; diſſolve in a pint of ſpring-water; to which may occaſionally be added, when the rheum is very great, and inflammation removed, half an ounce of tutty or compound powder of ceruſs.

3. Let the eye and eyelid be bathed three or four times a-day with a clean ſponge dipped in this waſh; or it may be applied with a feather, leaving a few drops on the eye. When the veins under the eye have been turgid, opening them with a lancet has often been found ſucceſsful.

4. Mr Gibſon, from his own experience, recommends the following, with which alone he has ſucceeded in moſt common caſes.

Take two drams of roſe-buds, infuſe them in half a pint of boiling water; when cold, pour off the infuſion, and add to it twenty grains of ſugar of lead.

This is to be uſed as the former; but the quantity of ſugar of lead may occaſionally be increaſed.

5. Sometimes from the violence of the inflammation, ſucceeding blows, and external injuries, the coats of the eye ſhall loſe their tranſparency, thicken, and turn white or of a pearl-colour: in the latter caſe, the horſe has ſome glimmering of light; in the former, he is blind while the eye continues in this ſtate.

6. If the horſe be fleſhy and of a groſs conſtitution, bleeding may be repeated, and a rowel will be neceſſary: let his diet be ſcalded bran or barley; avoiding for ſome days oats, beans, or any thing hard to chew.

The cooling opening drink, (p. 5. col. 2. par. 4.) ſhould be given every other day, which will anſwer better than aloetic purges.

7. If the eyelids continue ſwelled and moiſt, and the under ſide of the eye inflamed, an ounce of honey may be added to four ounces of the above waters; or the part may be well bathed with an ounce of honey of roſes, and half a dram of ſugar of lead, diſſolved in three ounces of ſpring-water: to which may be added, when the eye is very watery, a ſpoonful or two of red wine, which will help to thicken the matter and dry it up.

1. If

8. If a film or thick ſlough ſhould remain, it may be taken off, by blowing into the eye equal parts of white vitriol and ſugar-candy finely powdered.

Glaſs finely powdered, mixed up with honey and a little freſh butter, is much recommended by Dr Bracken for this purpoſe; as alſo the following ointment.

Take ointment of tutty one ounce, honey of roſes two drams, white vitriol burnt one ſcruple; this, with a feather, may be ſmeared over the eye twice a-day.

9. Let it be remembered, that it has long been obſerved in practice, that the eye in its firſt ſtate of inflammation is ſo very tender, that the eye-waters prepared with tutty and other powders aggravate the diſorder; conſequently, during this ſtate, the tinctures of vegetables and ſolutions of ſalts are greatly preferable.

10. Wounds of the eye may be dreſſed with honey of roſes alone, or with a little ſugar of lead mixed with it; adding thereto, after a few days, an eighth part of tincture of myrrh; all the preceding directions in regard to inflammation being attended to, eſpecially bleeding, rowels, and gentle cooling phyſic.

11. When the humours of the eye are thickened, and the diſorder is within the globe, ſharp external applications are not only uſeleſs, but extremely detrimental by the irritation they occaſion, and conſequently ſhould be avoided.

12. In all caſes of this ſort, whether moon-eyes, which are only cataracts forming, or in confirmed ones attended with a weeping; general evacuations, with internal alteratives, can only take place.

Theſe generally make their appearance, when a horſe is turned five coming ſix; at which time one eye becomes clouded, the eyelids being ſwelled, and very often ſhut up; and a thin water generally runs from the diſeaſed eye down the cheek, ſo ſharp as ſometimes to excoriate the ſkin; the veins of the temple, under the eye, and along the noſe, are turgid and full: though ſometimes it happens that the eye runs but little.

This diſorder comes and goes till the cataract is ripe; then all pain and running diſappears, and the horſe becomes totally blind, which is generally in about two years. During this time ſome horſes have more frequent returns than others; which continue in ſome a week or more, in others three or four; returning once in two or three months, and they are ſeldom ſo long as five without a relapſe.

13. There is another kind of moon-blindneſs which is alſo the forerunner of cataracts, where no humour or weeping attends. The eye is never ſhut up or cloſed here, but will now and then look thick and troubled, at which time the horſe ſees nothing diſtinctly: when the eyes appear ſunk and periſhing, the cataracts are longer coming to maturity; and it is not unuſual in this caſe for one eye to eſcape.

Theſe caſes generally end in blindneſs of one if not of both eyes; the moſt promiſing ſigns of recovery are when the attacks come more ſeldom, and their continuance grows ſhorter, and that they leave the cornea clear and tranſparent, and the globe plump and full.

14. The attempts to cure the cataracts have hitherto been only palliative and mitigating the ſymptoms; yet early care has ſometimes been ſucceſsful. To this end the horſe ſhould be rowel'd and bled at proper intervals; except where the eyes appear ſunk and periſhing, where it is often pernicious. During the violence of the ſymptoms, obſerve the cooling treatment above recommended, giving him two ounces of nitre every day mixed into a ball with honey; and bathe the parts above the eye with verjuice, or vinegar, wherein roſe-leaves are infuſed; to four ounces of which, half a dram of ſugar of lead may be added. The ſwelling on the lid may afterwards be bathed with a ſponge dipt in equal parts of lime and Hungary water, mixed together: the cooling phyſic, (p. 3. col. 1. par. 4. from bottom) ſhould be given every fourth day, till the eye becomes clear, and recovers, its uſual brightneſs. The following is alſo very proper phyſicfor this purpoſe.

Take lenitive electuary and cream of tartar of each four ounces, Glauber's ſalts three ounces, ſyrup of buckthorn two ounces.

When the weeping is by theſe means removed, the alterative powders (See the ſection, *Of* Alterative Medicines) ſhould be given every day, till two or three pounds are taken, and after an interval of three months the ſame courſe ſhould be repeated. This method has often been attended with good ſucceſs, where the eyes have been full, and no way periſhed; in that caſe, bathe or foment them with the following, twice a-day.

Take crude ſal armoniac two drams, diſſolve in a pint of lime-water, and add to it four ounces of brandy or Hungary water.

This will act as a ſtimulus, and may help to thin and rarify the gummy juices, and bring new ſupplies of nouriſhment to the periſhing eyes.

This courſe not ſucceeding, in order more powerfully to open the veſſels of the cryſtalline humour, (which in theſe caſes is always found opake, and, when the cataract is confirmed, entirely loſes its tranſparency,) and hinder as much as poſſible the forming of obſtructions, mercurials are chiefly to be depended on: thus give every other day, for three or four mornings, two drams of calomel, mixed up with conſerve of roſes; and then purge off with the common ball.

During this courſe, particular care ſhould be taken of the horſe: after repeating this, the alterative powders before-mentioned ſhould be given for ſome weeks or months if you expect any benefit from them; or they may be beat up into a ball with live millepedes, and an ounce and a half given every day; if theſe ſhould not ſucceed, and the horſe is a valuable one, the turbith courſe recommended in the ſection on alteratives ſeems to be the moſt promiſing method left. But to horſes that are not ſo, an ounce of antimony, ground into an impalpable powder, may be given every day in one of his feeds for three months or longer: or a ſtrong decoction of guaiacum ſhavings may be given for ſome time, to which crude antimony may be added, in the following manner.

Take guaiacum ſhavings one pound, crude antimony tied in a rag the ſame quantity; boil in two gallons of forge-water to one, and give a quart a-day, either alone, or mixed with his water.

15. The haws is a ſwelling and ſpongineſs that grows in the inner corner of the eye, ſo large ſometimes as to cover a part of the eye. The operation here is eaſily performed by cutting part of it away; but the farriers are apt to cut away too much: the wound may be dreſſed with honey of roſes; and if a fungus or ſpongy fleſh ariſes, it ſhould be ſprinkled with burnt alum, or touched

Of the Glanders.

touched with blue vitriol.

Sect. XII. *Of the Glanders.*

The cauſe and ſeat of the glanders has till lately been ſo imperfectly handled, and ſo little underſtood by the writers of this diſtemper, that it is no wonder it ſhould be ranked among the incurables: but a new light having been thrown on this whole affair by the ſtudy of M. La Foſſe, the king of France's farrier, who has been at the pains to trace out, and diſcover, by diſſections, the ſource and cauſe of this diſorder; we hope the method he has propoſed, with ſome further experiments and improvements, will ſoon bring to a certainty of cure (in moſt caſes at leaſt) a diſtemper ſo dangerous to our horſes, and that hitherto has eluded the force of art.

M. de la Foſſe has diſtinguiſhed ſeven different kinds of glanders, four of which are incurable.

The firſt proceeds from ulcerated lungs, the purulent matter of which comes up the trachea, and is diſcharged through the noſtrils, like a whitiſh liquor, ſometimes appearing in lumps and grumes: in this diſorder, though the matter is diſcharged from the noſtrils, yet the malady is ſolely in the lungs.

The ſecond is a waſting humour, which uſually ſeizes horſes at the decline of a diſeaſe, cauſed by too hard labour; this defluxion alſo proceeds from the lungs.

The third is a malignant diſcharge, which attends the ſtrangles ſometimes, and falls upon the lungs, which runs off by the noſtrils.

The fourth is, when an acrimonious humour in the farcy ſeizes theſe parts, where it ſoon makes terrible havock.

The fifth kind we ſhall deſcribe by and by, as ariſing from taking cold.

The ſixth kind is a diſcharge from the ſtrangles, which ſometimes vents itſelf at the noſtrils.

Theſe are the various diſorders which have been obſerved ſometimes to throw matter out from the noſtrils; let us now deſcribe the real glanders.

The matter, then, diſcharged from the noſtrils of a glandered horſe, is either white, yellow, or greeniſh, ſometimes ſtreaked or tinged with blood: when the diſeaſe is of long ſtanding, and the bones are fouled, the matter turns blackiſh, and becomes very fetid; and is always attended with a ſwelling of the kernels or glands under the jaws; in every other reſpect the horſe is generally healthy and ſound, till the diſtemper has been of ſome continuance.

It is always a bad ſign when the matter ſticks to the inſide of the noſtrils like glue or ſtiff paſte; when the inſide of the noſe is raw, and looks of a livid or lead colour; when the matter becomes bloody, and ſtinks; and when it looks of an aſh-colour. But when only a limpid fluid is firſt diſcharged, and afterwards a whitiſh matter, the gland under the jaw not increaſing, and the diſorder of no long continuance, we may expect a ſpeedy cure; for in this caſe, which ariſes from taking cold after a horſe has been overheated, the pituitary membrane is but ſlightly inflamed, the lymph in the ſmall veſſels condenſed, and the glands overloaded, but not yet ulcerated.

From theſe ſymptoms, and ſome obſervations made both by Bracken and Gibſon, it is plain they were not abſolute ſtrangers to the ſeat of this diſorder, though they neglected puſhing their inquiries to the fountain-head, and conſequently were at a loſs to know how to apply the remedy to the parts affected.

Of the Glanders.

But our author, after examining by diſſection the carcaſes of glandered horſes, and making a ſtrict ſcrutiny into the ſtate of the viſcera, aſſiſted for that purpoſe by ingenious and expert anatomiſts, for ten years together, affirms this diſeaſe to be altogether local; and that the true ſeat of it is in the pituitary membrane which lines the partition along the inſide of the noſe, the maxillary ſinuſes or cavities of the cheek-bones on each ſide the noſe, and the frontal ſinuſes or cavities above the orbits of the eyes. That the viſcera, as liver, lungs, &c. of glandered horſes, are in general exceeding ſound; and conſequently that the ſeat of this diſorder is not in thoſe parts, as has been aſſerted by moſt authors. Nor indeed is it probable it ſhould: for how could ſuch horſes preſerve their appetite, their good appearance, ſleek and ſhining coats; in a word, all the ſigns of health, for many years together (which many glandered horſes are known to enjoy), with ſuch diſtempered bowels?

But on nicely examining the heads of ſuch horſes, he found the cavities above-mentioned more or leſs filled with a viſcous ſlimy matter, and the membrane which lines both them and the noſtrils inflamed, thickened, and corroded with ſordid ulcers, which in ſome caſes had eat into the bones.

He obſerves, that when glandered horſes diſcharged matter from both noſtrils, both ſides of the membrane and cavities were affected; but when they ran at one noſtril only, that ſide only was found diſtempered.

It is a curious remark of our author, that the ſublingual glands, or the kernels ſituated under the jaw-bone, which are always ſwelled in this diſtemper, do not diſcharge their lymph into the mouth, as in man, but into the noſtrils; and that he conſtantly found their obſtruction agreed with the diſcharge: if one gland only was affected, then the horſe diſcharged from one noſtril only; but if both were, then the diſcharge was from both.

The ſeat of this diſorder thus diſcovered, our author with great ingenuity has paved the way for cure, by trepanning theſe cavities, and taking out a piece of bone, by which means the parts affected may be waſhed with a proper injection, and in fine the ulcers deterged, healed, and dried up.

But as, from the obſervations ſince made by this gentleman, there are different ſpecies of the glanders, ſo the cure of the milder kinds may firſt be attempted by injections and fumigations: thus, after taking cold, ſhould a horſe for 15 or 20 days diſcharge a limpid fluid or whitiſh matter from one or both noſtrils, the glands under the jaw rather growing harder than diminiſhing, we may expect it will degenerate into a true glanders. To prevent which, after firſt bleeding, and treating him as we have directed for a cold, let an emollient injection, prepared with a decoction of linſeed, marſhmallows, elder, camomile flowers, and honey of roſes, or ſuch like, be thrown up as far as poſſible with a ſtrong ſyringe, and repeated three times a-day; ſhould the running not leſſen or be removed in a fortnight by the uſe of this injection, a reſtringent one may now be prepared with tincture of roſes, lime-water, &c. and the noſtrils fumigated with the powders of frankincenſe, maſtich, amber, and cinnabar, burnt on an iron heated for that purpoſe; the fume of which may eaſily be conveyed through a tube into the noſtrils.

This method has been found ſucceſsful when uſed in time: but the methods of cure depend on the ſtubbornneſs of the diſorder; and when inveterate, recourſe muſt be had to the operation above deſcribed.

Sect. XIII. *Of the Colic or Gripes, and Pains in the Bowels, from ſudden accidents.*

There ſeems to be no diſtemper ſo little underſtood by the common farrier, as the colic or gripes in horſes, one general remedy or method ſerving them in all caſes: but as this diſorder may be produced by very different cauſes, the method of cure muſt alſo vary; otherwiſe the intended remedy, injudiciouſly applied, will not only aggravate the complaint, but make it fatal. We ſhall divide this diſorder into three different ſpecies: the flatulent or windy, the bilious or inflammatory, and the dry gripes; each of which we ſhall diſtinguiſh by their different ſymptoms, and then point out the proper remedies.

1. The flatulent or windy colic is thus known. The horſe is often lying down, and as ſuddenly riſing again with a ſpring; he ſtrikes his belly with his hinder feet, ſtamps with his fore-feet, and refuſes his meat; when the gripes are violent, he will have convulſive twitches, his eyes be turned up and his limbs ſtretched out as if dying, his ears and feet being alternately very hot and cold; he falls into profuſe ſweats, and then into cold damps; ſtrives often to ſtale, and turns his head frequently to his flanks; he then falls down, rolls about, and often turns on his back; this laſt ſymptom proceeds from a ſtoppage of urine, that almoſt always attends this ſort of colic, which may be increaſed by a load of dung preſſing on the neck of the bladder.

Theſe are the general ſymptoms of colic and gripes from wind, drinking cold water when hot, and when the perſpirable matter is retained, or thrown on the bowels by catching cold; in all which caſes they are violently diſtended. Cribbing horſes are more particularly ſubject to this complaint, by reaſon they are conſtantly ſucking in great quantities of air.

The firſt intention is to empty the ſtrait gut with a ſmall hand dipt in oil, which frequently makes way for the confined wind to diſcharge itſelf; and by eaſing the neck of the bladder, the ſuppreſſion of urine is taken off, and the horſe ſtales and gets eaſe.

The following ball and glyſter ſeldom fail of giving relief in theſe caſes.

Take Straſburgh or Venice turpentine, and juniper-berries pounded, of each half an ounce; ſalt-prunella or ſalt-petre, an ounce; oil of juniper, one dram; ſalt of tartar, two drams: make into a ball with any ſyrup; it may be given whole, and waſhed down with a decoction of juniper-berries, or a horn or two of ale.

If the horſe does not break wind, or ſtale plentifully, he will find no relief: therefore in an hour or two give him another ball, and add to it a dram of ſalt of amber; which may be repeated a third time, if found neceſſary. During the fit the horſe may be walked and trotted gently; but ſhould by no means be haraſſed beyond his ability, or dragged about till he is jaded.

The following glyſter may be given, between the balls, or alone, and repeated occaſionally.

Take camomile flowers two handfuls; anniſe, coriander, and fennel ſeeds, of each an ounce; long pepper half an ounce; boil in three quarts of water to two; and add Daffy's elixir, or gin, half a pint; oil of amber half an ounce, and oil of camomile eight ounces.

The ſigns of a horſe's recovery, are his lying quiet, without ſtarting, or tumbling, and his gathering up his legs, and ceaſing to laſh out; and if he continues an hour in this quiet poſture, you may conclude all danger over.

2. The next ſpecies of colic we ſhall deſcribe, is the bilious or inflammatory; which beſides moſt of the preceding ſymptoms, is attended with a fever, great heat, panting, and dryneſs of the mouth: the horſe alſo generally throws out a little looſe dung, with a hot ſcalding water; which, when it appears blackiſh, or of a rediſh colour, and fetid ſmell, denotes an approaching mortification.

In this caſe the horſe ſhould immediately be bled to the quantity of three quarts; and it ſhould be repeated, if the ſymptoms do not abate in a few hours. The emollient glyſter, with two ounces of nitre diſſolved in it, ſhould be thrown up twice a-day, to cool the inflamed bowels; plenty of gum-arabic water ſhould be taken, and a pint of the following drink given every two or three hours till ſeveral looſe ſtools are procured, and then it ſhould be given only night and morning till the diſorder is removed.

Take ſenna three ounces, ſalt of tartar half an ounce; infuſe in a quart of boiling water an hour or two; then ſtrain off, and add two ounces of lenitive electuary, and four of Glauber's ſalts.

If this diſorder is not removed by theſe means, but the inflammation and fever increaſe, attended with a diſcharge of the fleſh-coloured water above deſcribed, the event will moſt probably be fatal: and the chief thing to be depended on now, muſt be a ſtrong decoction of Jeſuit's bark, given to the quantity of a pint every three hours, with a gill of red port-wine.

A quart of the ſame may be uſed for a glyſter, with two ounces of Venice turpentine, diſſolved with the yolks of two eggs, an ounce of diſacordium, and a pint of red wine, and given twice a-day: if the horſe recovers, give two or three mild rhubarb purges.

3. The laſt we ſhall deſcribe is the dry gripes, or the colic, which ariſes often from coſtiveneſs; it is diſcovered by the horſe's frequent and fruitleſs motion to dung, the blackneſs and hardneſs of the dung, the frequent and quick motion of his tail, the high colour of his urine, and his great reſtleſſneſs and uneaſineſs.

In this caſe the ſtrait gut ſhould be examined and emptied with a ſmall hand oiled properly for that purpoſe; the emollient oily glyſter (p. 4. col. 1. par. 2.) ſhould be thrown up twice a-day; and the above purging drink given, till the bowels are unloaded, and the ſymptoms removed.

The diet for a horſe in the gripes, ſhould be ſcalded bran, warm water-gruel, or white water, made by diſſolving four ounces of gum-arabic in a quart of water, and mixing it with his other water.

4. From this hiſtory and diviſion of gripes and colics, with their different treatment, it appears how abſolutely neceſſary it is they ſhould be well underſtood, in

order to be managed ſkilfully: it is plain too, that violent hot medicines ſhould in every ſpecies of this diſorder be guarded againſt, and given with great caution and diſcretion, even in the firſt kind of flatulent colic, where indeed they can only be wanted; yet too often, when prepared by the farriers with oil of turpentine, geneva, pepper, and brine, *&c.* they even increaſe that diſorder, by ſtimulating the neck of the bladder, too forcibly heating the blood, and inflaming the bowels, till a mortification is brought on them. Theſe are, in general, the conſtant appearances of horſes that die of this diſorder; whoſe bowels being examined for that purpoſe, have been found inflamed, full of red and livid ſpots, ſometimes quite black, criſped with extreme heat, and rotten.

SECT. XIV. *Of the Lax and Scouring, with other Diſorders of the Stomach and Bowels.*

It is ſometimes a nice matter to form a proper judgment when to controul or encourage a looſeneſs; but theſe general rules may be a direction: If a healthy full horſe, on taking cold, or upon hard riding, overfeeding, eating unwholeſome food, or with a ſlight fever, ſhould have a moderate purging, by no means think of ſtopping it; but rather encourage it with an open diet, and plenty of warm gruel: but if it continues long, with gripings, the mucus of the bowels coming away, and the horſe loſing his appetite and fleſh, it is then high time to give him proper medicines; if he voids great quantities of ſlime and greaſy matter, give him the following drench, and repeat it every other day for three times.

Take lenitive electuary and cream of tartar of each four ounces, yellow roſin finely powdered one ounce, and four ounces of ſweet oil; mix with a pint of water-gruel.

The following alterative ball alone has been found ſucceſsful for this purpoſe when given twice a-week, with ſcalded bran and warm gruel.

Take ſocotorine aloes half an ounce, diapente one ounce; make into a ball with the juice of Spaniſh liquorice diſſolved in water, and a ſpoonful of oil of amber.

To this may be added two drams of myrrh, and a dram of ſaffron, and (where it can be afforded) half an ounce of rhubarb.

When the purging is attended with a fever, rhubarb ſhould firſt be given to the quantity of half an ounce, with an ounce and half of lenitive electuary; at night, after the working, give half an ounce or more of diaſcordium in a pint of red wine mulled with cinnamon; and repeat it every day, and the rhubarb-ball once in two or three.

But if the diſtemper increaſes, the horſe's flanks and belly look full and diſtended, and he appears griped and in pain, let this glyſter be given, and the quantity of diaſcordium increaſed an ounce in his night-drink.

Take camomile flowers one handful, red roſes half a handful, pomegranate and baulauſtines of each an ounce; boil in two quarts of water to one; ſtrain off, and diſſolve in it two or three ounces of diaſcordium, and one of mithridate; to which may be added a pint of port wine: repeat it once a-day.

If the flux continues violent, give an ounce of rock-alum, with an ounce and a half of bole, twice a-day; or, diſſolve double this quantity with two ounces of diaſcordium, and the cordial ball, in two quarts of hartshorn drink; to which may be added a pint of port; and give the horſe, three or four times a-day, a pint of this drink. For this purpoſe alſo a ſtrong decoction of oak-bark may be given, with either of the above remedies, and to the ſame quantity; even by itſelf, it will be found on trial no inconſiderable remedy.

When the diſcharge is attended with an acrid mucus or ſlime, the griping and pains are very ſevere, the common lining of the bowels being waſhed away; in this caſe the following glyſter ſhould frequently be injected warm.

Take of tripe-liquor or thin ſtarch two quarts, oil of olives half a pint, the yolk of ſix eggs well broke, and two or three ounces of coarſe ſugar.

Some horſes, having naturally weak ſtomachs and bowels, throw out their aliment undigeſted; their dung is habitually ſoft and of a pale colour; they feed poorly, and get no fleſh: to remedy this complaint, give the following purge two or three times; and then the infuſion to the quantity of a pint every morning.

Take ſocotorine aloes ſix drams, rhubarb powdered three drams, myrrh and ſaffron each a dram; make into a ball with ſyrup of ginger.

Infuſion.—Take zedoary, gentian, winters-bark, and orange-peel, of each two ounces; pomegranate-bark and balauſtines of each an ounce; camomile-flowers and centaury, each a handful; cinnamon and cloves, each an ounce: infuſe in a gallon of port or ſtrong beer.

The bloody-flux is a diſtemper horſes are not very ſubject to; however, as it ſometimes does occur, whenever blood is diſcharged, attended with gripings and great pain in the bowels, if the flux is not ſpeedily reſtrained the horſe probably may be ſoon loſt: we recommend therefore the following glyſter and drink for that purpoſe.

Take oak-bark four ounces, tormentil-root two ounces, burnt hartſhorn three ounces; boil in three quarts of forge-water to two; ſtrain off, and add two ounces of diaſcordium, four ounces of ſtarch, and half a dram of opium.

A glyſter may alſo be prepared with the ſame quantity of fat broth, ſtarch, and opium, in order to plaſter over the coats of the bowels, and abate their violent irritations. Alſo,

Take ſoft chalk two ounces, mithridate or diaſcordium one ounce, powder of Indian-root half a dram, liquid laudanum 50 or 60 drops; diſſolve in a pint of hartſhorn drink, and add to it four ounces of cinnamon-water and red wine; give it twice a-day.

Gum-arabic diſſolved in hartſhorn drink, or in common water, ſhould be the horſe's uſual drink.

When horſes are apt to be coſtive, from whatever cauſe it ariſes, gentle openers ſhould be given; ſuch as cream of tartar, Glauber's ſalts, and lenitive electuary: four ounces of any two of theſe diſſolved in warm ale, whey, or water, given every other morning for two or three times, will anſwer this purpoſe; eſpecially if aſſiſted by an oily emollient glyſter, prepared with a handful of ſalt. Scalded bran or barley, with an ounce of fenugreek and linſeed, occaſionally given, will prevent this complaint: but where it is conſtitutional, and proceeds from the power and force of digeſtion in the ſtomach and guts, as ſometimes happens, and the horſe is in perfect health, no inconvenience will ariſe from it; and it is obſerved that ſuch horſes are able to endure great fatigue and labour.

SECT. XV. *Of Worms and Botts.*

AUTHORS have deſcribed three different ſorts of worms that affect horſes, *viz.* *Botts*, which young horſes are often troubled with in the ſpring; the *Rotundi*, or thoſe reſembling earth-worms; and the *Aſcarides*, or thoſe about the ſize of the largeſt ſewing needle, with flat heads.

The botts which breed in the ſtomachs of horſes, and are ſometimes the cauſe of convulſions, appear to be very large maggots, compoſed of circular rings, with little ſharp prickly feet along the ſides of their bellies (like the feet of hog-lice), which by their ſharpneſs (like the points of the fineſt needles) ſeem to be of uſe to faſten them to the part where they breed and draw their nouriſhment, and to prevent their being looſened from ſuch adheſion before they come to maturity. The eggs from whence thoſe botts are produced, are diſperſed into cluſters all round the lower orifice of the ſtomach, and are laid under the inner coat or thin membrane of the ſtomach; ſo that when the animals come to form and life, they burſt through this inner coat with their breech and tail ſtraight outwards, and their trunks ſo fixed into the muſcular or fleſhy coat of the ſtomach, that it ſometimes requires a good pull to diſengage them; from the blood of this laſt coat they draw their nouriſhment, which they ſuck like ſo many leeches, every one ulcerating and purſing up the part where it fixes like a honey-comb; and they often make ſuch quick havock, as to deſtroy the horſe.

The ſymptoms of worms are various. The botts that many horſes are troubled with in the beginning of the ſummer, are always ſeen ſticking on the ſtrait gut, and are often thruſt out with the dung, with a yellowiſh coloured matter like melted ſulphur: they are no ways dangerous there; but are apt to make a horſe reſtleſs and uneaſy, and rub his breech againſt the poſts. The ſeaſon of their coming is uſually in the months of May and June; after which they are ſeldom to be ſeen, and rarely continue in any one horſe above a fortnight or three weeks. Thoſe that take their lodgment in the ſtomach, are extremely dangerous by cauſing convulſions; and are ſeldom diſcovered by any previous ſigns before they come to life, when they throw a horſe into violent agonies. The other kinds are more troubleſome than dangerous; but are known by the following ſigns: The horſe looks lean and jaded, his hair ſtares as if he was ſurfeited, and nothing he eats makes him thrive; he often ſtrikes his hind-feet againſt his belly; is ſometimes griped, but without the violent ſymptoms that attend a colic and ſtrangury; for he never rolls and tumbles, but only ſhews uneaſineſs, and generally lays himſelf down quietly on his belly for a little while, and then gets up and falls a feeding; but the ſureſt ſign is when he voids them with his dung.

For the cure of botts in the ſtomach, calomel ſhould firſt be given in large quantities, and repeated at proper intervals; Æthiops mineral, or ſome of the under-mentioned forms, may be given afterwards.

But botts in the ſtrait gut may be cured by giving the horſe a ſpoonful of ſavin, cut very ſmall, once or twice a-day in his oats or bran, moiſtened; and three or four of cloves of garlick may be added to advantage. Give alſo an aloetic purge between whiles; the following ſtands recommended.

TAKE fine ſocotorine aloes, ten drams; freſh jalap, one dram; ariſtolochia, or birthwort, and myrrh powdered, of each two drams; oil of ſavin and amber, of each one dram; ſyrup of buckthorn enough to form into a ball.

But as the ſource of worms in general proceeds from a vitiated appetite and a weak digeſtion, recourſe muſt firſt be had to mercurials, and afterwards to ſuch things as are proper to ſtrengthen the ſtomach, promote digeſtion, and, by deſtroying the ſuppoſed ova, prevent the regeneration of theſe animals. Thus, two drams of calomel may be given with half an ounce of diapente, and mixed up with conſerve of wormwood, over-night; and the next morning the above purge: theſe may be repeated ſix or eight days. Or the following mercurial purge may be given, which will be leſs troubleſome, and no leſs efficacious.

TAKE crude quick-ſilver two drams, Venice turpentine half an ounce; rub the quick-ſilver till no gliſtening appears; then add an ounce of aloes, a dram of grated ginger, 30 drops of oil of ſavin, and a ſufficient quantity of ſyrup of buckthorn to make a ball.

One of theſe balls may be given every ſix days, with the uſual precautions in regard to mercurial phyſic; and the following powder intermediately.

TAKE powdered tin and Æthiops mineral of each half an ounce: give every night in a maſh, or among his corn.

The various preparations of antimony and mercury muſt be given ſeveral weeks together, in order to get entire riddance of theſe vermin. The Æthiops mineral may be given to the quantity of half an ounce a-day; the mercurius alkaliſatus to two drams a-day, incorporated with a bit of cordial ball. The cinnabar powders, as directed in the farcy, are no leſs effectual: and when worms are bred from high feeding, or unwholeſome food; rue, garlick, tanſy, ſavin, box, and many other ſimples, may be given ſucceſsfully; being for that purpoſe mixed with their food; as alſo cut tobacco, from half an ounce to an ounce a-day.

SECT. XVI. *Of the Yellows, or Jaundice.*

HORSES are frequently ſubject to this diſtemper; which is known by a duſky yellowneſs of the eyes; the inſide of the mouth and lips, the tongue, and bars of the roof of the mouth, looking alſo yellow. The horſe is dull, and refuſes all manner of food; the fever is ſlow, yet both that and the yellowneſs increaſe together. The dung is often hard and dry, of a pale yellow, or light pale green. His urine is commonly of a dark dirty brown colour; and when it has ſettled ſome time on the pavement, it looks red like blood. He ſtales with ſome pain and difficulty; and if the diſtemper is not checked ſoon, grows delirious and frantic. The off-ſide of the belly is ſometimes hard and diſtended; and in old horſes, when the liver has been long diſeaſed, the cure is not practicable, and ends fatally with a waſting diarrhœa: but when the diſtemper is recent, and in young horſes, there is no fear of a recovery, if the following directions are obſerved.

Firſt of all bleed plentifully; and give the laxative glyſter (p. 5. col. 2. par. 1.) as horſes are apt to be very coſtive in this diſtemper; and the next day give him this purge:

Take of Indian rhubarb powdered one ounce and a half, ſaffron two drams, ſocotorine aloes ſix drams, ſyrup of buckthorn a ſufficient quantity.

If the rhubarb ſhould be found too expenſive, omit it, and add the ſame quantity of cream of tartar, and half an ounce of Caſtile ſoap, with four drams more of aloes. This may be repeated two or three times, giving intermediately the following balls and drink.

Take of Ethiops mineral half an ounce, millepedes the ſame quantity, Caſtile ſoap one ounce; make into a ball, and give one every day, and waſh it down with a pint of the following decoction.

Take madder-root and turmerick of each four ounces, burdock-root ſliced half a pound, Monk's rhubarb four ounces, liquorice ſliced two ounces; boil in a gallon of forge-water to three quarts; ſtrain off, and ſweeten with honey.

Balls of Caſtile ſoap and tumerick may be given alſo for this purpoſe to the quantity of three or four ounces a-day, and will in moſt recent caſes ſucceed.

By theſe means the diſtemper generally abates in a week, which may be diſcovered by an alteration in the horſe's eyes and mouth; but the medicines muſt be continued till the yellowneſs is entirely removed. Should the diſtemper prove obſtinate, and not ſubmit to this treatment, you muſt try more potent remedies, viz. mercurial phyſic, repeated two or three times at proper intervals; and then the following balls.

Take ſalt of tartar two ounces, cinnabar of antimony four ounces, live millepedes and filings of ſteel of each three ounces, ſaffron half an ounce, Caſtile or Venice ſoap half a pound; make into balls, the ſize of a pullet's egg, with honey; and give one night and morning, with a pint of the above drink.

It will be proper, on his recovery, to give two or three mild purges; and, if a fat full horſe, to put in a rowel.

Sect. XVII. *Of the Diſorders of the Kidneys and Bladder.*

The ſigns of the kidneys being hurt or affected are, a weakneſs of the back and loins, difficulty of ſtaling, faintneſs, loſs of appetite, and deadneſs in the eyes; the urine is thick, foul, and ſometimes bloody, eſpecially after a violent ſtrain. A horſe diſeaſed in his kidneys can ſeldom *back*, that is, move ſtraight backwards, without pain, which is viſible as often as he is put to the trial: the ſame thing is obſervable indeed in horſes whoſe backs have been wrung and wrenched; but with this difference, that in the latter there is ſeldom any defect or alteration in the urine, except that it is higher coloured.

Bleeding is the prime remedy, and that plentifully, in order to prevent inflammation; and the more ſo, if a fever attends a difficulty in ſtaling, for then we may ſuſpect the kidneys already inflamed. A rowel in the belly has been found uſeful; and the following balls may be given twice or thrice a-day, with a pint of marſhmallow decoction, in which half an ounce of gum arabic is diſſolved, with an ounce of honey.

Take Locatellus-balſam one ounce, ſpermaceti ſix drams, ſal prunella half an ounce; mix into a ball with honey: if the urine is bloody, add half an ounce of Japan earth.

Should the fever continue, bleed largely, give emolient glyſters, and the cooling opening drink, (p. 5. col. 1. par. 5.) till it abates.

If the urine paſſes with difficulty and pain, notwithſtanding theſe means, give this ball, and repeat it twice or thrice a-day till the horſe ſtales freer and without pain, his urine become of a right conſiſtence, and free from any purulent ſediment.

Take balſam of copivi or Straſburg turpentine, and Venice ſoap, of each one ounce, nitre ſix drams, myrrh powdered two drams; make into a ball with honey, and waſh it down with the marſhmallow decoction.

As a ſuppreſſion of urine ariſes ſometimes from an inflammation of the kidneys; ſo at others, from a paralytic diſorder, diſabling them in their office of ſeparating the urine from the blood: in this latter caſe, the bladder is uſually empty, ſo that a horſe will make no motion to ſtale; and if he continues a few days in this condition, his body will ſwell to a great degree, break out in blotches all over, and death will ſoon cloſe the ſcene.

If it ariſes from inflammation, bleed largely, and treat the horſe as above recommended; but if not, give ſtimulating glyſters, and ſtrong diuretics, ſuch as the following balls, once in four hours: for if a horſe ſtales not in 30 hours, his danger muſt be great.

Take juniper-berries powdered one ounce, ſal prunella ſix drams, etherial oil of turpentine half an ounce, camphor one dram, oil of juniper two drams; make into a ball with honey, and give after it three or four horns of the marſhmallow decoction and honey.

Or, Take ſquills powdered two or three drams, nitre half an ounce or ſix drams; make into a ball with honey.

If the complaint is not removed by theſe means, rub the horſe's reins well with two parts of oil of turpentine, and one of oil of amber; and apply a poultice of garlic, horſe-radiſh, muſtard-ſeed, camphor, and green ſoap, ſpread on thick cloth, over them. Give the horſe alſo two drams of calomel over night, and a moderate purge the next morning. Theſe perhaps are the chief and beſt remedies that can be given in this generally fatal diſorder.

When the ſtrangury in a horſe does not ariſe from wind, or dung preſſing on the neck of the bladder (as was obſerved in the Section on Colics), the cauſe is from inflammation, or too long a retention of the urine. Such horſes make frequent motions to ſtale, ſtand wide and ſtraddling, are full, and have their flanks diſtended. In this caſe bleed largely; give the following drink, and repeat it every two hours, for two or three times, till the horſe is relieved.

Take Venice turpentine, broke with the yolk of an egg, one ounce, nitre or ſal prunella ſix drams, half a pint of ſweet oil, and a pint of white wine.

If this drink ſhould not have the deſired effect, the

Of Molten-greaſe.

diuretic ball abovementioned may be given in the ſame manner, omitting the myrrh.

Give the horſe plenty of the marſhmallow-decoction; in a quart of which diſſolve an ounce of nitre and gum arabic, and two of honey.

Horſes ſubject to a *diabetes*, or profuſe ſtaling, if old, or of a weak conſtitution, are ſeldom cured; they ſoon loſe their fleſh and appetite, grow feeble, their coat ſtaring, and they die rotten. Of a young horſe there are more hopes; but he muſt not be indulged with too much water, or moiſt food. Give him the following:

> Take jeſuits bark four ounces, biſtort and tormentil-root of each two ounces; boil in two gallons of lime-water to the conſumption of half, and give a pint three times a-day.

As this diſorder generally proceeds from too violent exerciſe, over-ſtraining, &c. repeated bleedings in ſmall quantities are abſolutely neceſſary, till the mouths of the veſſels cloſe up.

Sect. XVIII. *Of Molten-greaſe.*

By molten-greaſe is meant a fat or oily diſcharge with the dung; and it ariſes from a colliquation or melting down of the fat of a horſe's body by violent exerciſe in very hot weather. It is always attended with a fever, heat, reſtleſſneſs, ſtarting and tremblings, great inward ſickneſs, ſhortneſs of breath, and ſometimes with the ſymptoms of a pleuriſy. His dung will be extremely greaſy, and he will fall into a ſcouring; his blood will have a thick ſkin or fat over it when cold, of a white or yellow hue, but chiefly the latter; the congealed part or ſediment is commonly a mixture of ſize and greaſe, which makes it ſo extremely ſlippery, that it will not adhere to the fingers, and the ſmall portion of ſerum feels alſo ſlippery and clammy. The horſe ſoon loſes his fleſh and fat, which probably is diſſolved and abſorbed into the blood; and thoſe that ſurvive this ſhock commonly grow hide-bound for a time, their legs ſwelling both before and behind, and continue in this ſtate till the blood and juices are rectified; and if this is not done effectually, the farcy, or ſome obſtinate ſurfeit, generally follows very difficult to remove.

In the firſt place bleed plentifully, and repeat it for two or three days ſucceſſively in ſmaller quantities; two or three rowels ſhould alſo be immediately put in, and the cooling emollient glyſters (p. 5. col. 2. par. 2, 3.) daily thrown up to abate the fever, and drain off the greaſy matter from the inteſtines. By the mouth give plenty of warm water or gruel, with cream of tartar or nitre, to dilute and attenuate the blood, which in this caſe is greatly diſpoſed to run into grumes, and endanger a total ſtagnation.

When the fever is quite gone off, and the horſe has recovered his appetite, gentle aloetic purges ſhould be given once a-week, for a month or ſix weeks, in order to bring down the ſwelled legs. To this end give the following; which, repeated for ſome time, will entirely remove this diſorder.

> Take of ſocotorine aloes ſix drams, of gum guaiacum powdered half an ounce, of diaphoretic antimony and powder of myrrh of each two drams; make into a ball with ſyrup of buckthorn.

Theſe will ſeldom take a horſe from his buſineſs above two or three days in a week; neither will he loſe his fleſh or appetite with them, but on the contrary mend in both; which cannot be obtained by any other method of purging, and gives this greatly the preference in many caſes.

Of Surfeits, &c.

Sect. XIX. *Of Surfeits, Mange, and Hide-bound.*

Surfeits ariſe from various cauſes; but are commonly the effects of ſome diſeaſes not attended to, or that have been ill cured.

A horſe is ſaid to be ſurfeited, when his coat ſtares, and looks ruſty and dirty, though proper means have not been wanting to keep him clean. The ſkin is full of ſcales and dander, that lies thick and meally among the hair, and is conſtantly ſupplied with a freſh ſucceſſion of the ſame, for want of due tranſpiration. Some horſes have hurdles of various ſizes, like peas or tares; ſome have dry fixed ſcabs all over their limbs and bodies; others a moiſture, attended with heat and inflammation; the humours being ſo ſharp, and violently itching, that the horſes rub ſo inceſſantly, as to make themſelves raw. Some have no eruptions at all; but an unwholeſome look, and are dull, ſluggiſh, and lazy: ſome appear only lean and hide-bound; others have flying pains and lameneſs, reſembling a rheumatiſm: ſo that in the ſurfeits of horſes, we have almoſt all the different ſpecies of the ſcurvy and other chronical diſtempers.

The following method is uſually attended with ſucceſs in the dry ſpecies. Firſt take away about three or four pounds of blood, and then give the following mild purge, which will work as an alterative, and ſhould be repeated once a-week or ten days for ſome time.

> Take ſocotorine aloes ſix drams or one ounce, gum guaiacum half an ounce, diaphoretic antimony and powder of myrrh of each two drams; make into a ball with ſyrup of buckthorn.

In the intermediate days, an ounce of the following powder ſhould be given, morning and evening, in his feeds.

> Take native cinnabar, or cinnabar of antimony, finely powdered, half a pound; crude antimony, in fine powder, four ounces; gum guaiacum, alſo in powder, four ounces; make into 16 doſes for eight days.

This medicine muſt be repeated till the horſe coats well, and all the ſymptoms of ſurfeit diſappear.

The wet ſurfeit, which is no more than a moiſt running ſcurvy, appears on different parts of the body of a horſe, attended ſometimes with great heat and inflammation; the neck oftentimes ſwells ſo in one night's time, that great quantities of a hot briny humour iſſue forth, which, if not allayed, will be apt to collect on the poll or withers, and produce the poll-evil or fiſtula. This diſeaſe alſo frequently attacks the limbs, where it proves obſtinate and hard to cure, and in ſome horſes ſhows itſelf ſpring and fall.

In this caſe bleed plentifully, avoid externally all repellers, and give cooling phyſic twice a-week; as, four ounces of lenitive electuary, with the ſame quantity of cream of tartar; or the latter, with four ounces of Glauber's ſalts, quickened, if thought proper, with two or three drams of powder of jalap, diſſolved in water-gruel, and given in a morning faſting.

After three or four of theſe purges, two ounces of nitre made into a ball with honey may be given every morning for a fortnight; and if attended with ſucceſs, repeat it for a fortnight longer.

The powders above-mentioned may be alſo given with the horſe's corn; or a ſtrong decoction of guaiacum ſhavings or logwood may be given alone to the quantity of two quarts a-day. Theſe, and indeed all alterative medicines, muſt be continued for a long time where the diſorder proves obſtinate.

The diet ſhould be cool and opening, as ſcalded bran or barley; and if the horſe is hide-bound, an ounce of fenugreek ſeeds ſhould be given in his feeds for a month or longer; and, as this diſorder often proceeds from worms, give the mercurial phyſic too, and afterwards the cinnabar powders, as above directed. But as in general it is not an original diſeaſe, but a ſymptom only of many, in the cure regard muſt be had to the firſt cauſe: thus, as it is an attendant on ſurfeits, fevers, worms, &c. the removal of this complaint muſt be variouſly effected.

In a mangy horſe the ſkin is generally tawny, thick, and full of wrinkles, eſpecially about the mane, the loins, and tail; and the little hair that remains in thoſe parts ſtands almoſt always ſtraight out or briſtly; the ears are commonly naked and without hair, the eye and eye-brows the ſame; and when it affects the limbs, it gives them the ſame aſpect: yet the ſkin is not raw, nor peels off, as in the hot inflamed ſurfeit.

Where this diſtemper is caught by infection, if taken in time it is very eaſily cured: and we would recommend a ſulphur ointment as moſt effectual for that purpoſe, rubbed in every day. To purify and cleanſe the blood, give antimony and ſulphur for ſome weeks after. There are a great variety of external remedies for this purpoſe, ſuch as train-oil and gun-powder, tobacco ſteeped in chamber ley, &c. Soleſeyl recommends the following.

TAKE burnt alum and borax in fine powder of each two ounces, white vitriol and verdigris powdered of each four ounces; put them into a clean pot, with two pounds of honey, ſtirring till they are incorporated; when cold, add two ounces of ſtrong aqua-fortis.

But when this diſorder is contracted by low feeding, and poverty of blood, the diet muſt be mended, and the horſe properly indulged with hay and corn. The following ointments are effectually uſed for this diſorder rubbed into the parts affected every day.

TAKE powdered brimſtone, train-oil, and tar, of each equal quantities; to which may be added ginger, or white hellebore.

Or, TAKE ſulphur vivum half a pound, crude ſal armoniac one ounce, hogs lard or oil a ſufficient quantity to form into an ointment.

Theſe are both very powerful remedies for this diſorder, and can ſcarce fail of ſucceſs.

SECT. XX. *Of the Farcin or Farcy.*

THE true farcy is properly a diſtemper of the blood-veſſels, which generally follows the tract of the veins, and, when inveterate, thickens their coats and integuments, ſo that they become like ſo many chords. We ſhall not deſcribe the different ſorts of farcies, ſeeing they are only degrees of one and the ſame diſtemper but proceed to paint the diſtemper by its ſymptoms, which are pretty manifeſt to the eye.

At firſt, one or more ſmall ſwellings, or round buds like grapes or berries, ſpring out over the veins, and are often exquiſitely painful to the touch; in the beginning they are hard, but ſoon turn into ſoft bliſters, which when broke diſcharge an oily or bloody ichor, and turn into very foul and ill-diſpoſed ulcers. In ſome horſes it appears on the head only; in ſome on the external jugular; in others on the plate-vein, and runs downwards on the inſide of the fore-arm towards the knee, and very often upwards towards the briſket: in ſome the farcy ſhews itſelf on the hind-parts, about the paſterns, and along the large veins on the inſide of the thigh, riſing upwards into the groin, and towards the ſheath; and ſometimes the farcy makes its appearance on the flanks, and ſpreads by degrees towards the lower belly, where it often becomes very troubleſome.

When the farcy appears on the head only, it is eaſily cured; eſpecially when it is ſeated in the cheeks and fore-head, the blood-veſſels being here ſmall: but it is more difficult when it affects the lips, the noſtrils, the eyes, the kernels under the jaws, and other ſoft and looſe parts, eſpecially if the neck-vein becomes corded. When it begins on the outſide of the ſhoulder or hips, the cure is ſeldom difficult: but when the farcy ariſes on the plate-vein, and that vein ſwells much, and turns corded, and the glands or kernels under the arm-pit are affected, it is hard to cure; but more ſo when the crural veins withinſide of the thigh are corded, and beſet with buds, which affects the kernels of the groin and the cavernous body of the yard. When the farcy begins on the paſterns or lower limbs, it often becomes very uncertain, unleſs a timely ſtop is put to it; for the ſwelling in thoſe dependant parts grows ſo exceſſively large in ſome conſtitutions, and the limbs ſo much disfigured thereby with foul ſores and callous ulcerations, that ſuch a horſe is ſeldom fit for any thing afterwards but the meaneſt drudgery: but it is always a promiſing ſign, wherever the farcy happens to be ſituated, if it ſpreads no further. It is uſual to affect only one ſide at a time; but when it paſſes over to the other, it ſhews great malignancy: when it ariſes on the ſpines, it is then for the moſt part dangerous; and is always more ſo to horſes that are fat and full of blood, than to thoſe that are in a more moderate caſe. When the farcy is epidemical, as ſometimes happens, it riſes on ſeveral parts of the body at once, forms naſty foul ulcers, and makes a profuſe running of greeniſh bloody matter from both noſtrils; and ſoon ends in a miſerable rot.

When the farcy makes its firſt appearance on the head, it riſes on the cheeks and temples, and looks like a net-work, or ſmall creeping twigs full of berries. Sometimes it inflames the eye, and ſometimes little bliſters or buds run along the ſide of the noſe. It ariſes often on the outſide of the ſhoulder, running along the ſmall veins with heat and inflammation; and ſometimes a few ſmall buds appear near the withers, and on the outſide of the hip. In all theſe appearances, the diſeaſe being ſuperficial, and affecting only the ſmaller veſſels, is eaſily conquered by the following method, when taken in time; for the ſimpleſt farcy, if neglected, may degenerate into the worſt ſort

This diſtemper, then, being of an inflammatory nature, Of the Farcy.

ture, and in a particular manner affecting the blood-veſſels, muſt neceſſarly require large bleeding, particularly where the horſe happens to be fat and full of blood. This always checks the beginning of a farcy, but is of ſmall ſervice afterwards; and if a horſe is low in fleſh, the loſs of too much blood ſometimes proves injurious. After bleeding, let the horſe have four ounces of cream of tartar and lenitive electuary; which may be given every other day for a week, to cool the blood and the body; and then give nitre three ounces a-day for three weeks or a month, and anoint the buds or ſwellings with the following ointment twice a-day.

Take ointment of elder four ounces, oil of turpentine two ounces, ſugar of lead half an ounce, white vitriol powdered two drams; mix together in a gally-pot.

The buds ſometimes by this method are diſperſed, leaving only little bald ſpots which the hair ſoon covers again. When they break and run, if the matter be thick and well digeſted, they will ſoon be well: but in order to confirm the cure, and to diſperſe ſome little lumps which often remain for ſome time on the ſkin without hair, give the liver of antimony for a month; two ounces a-day for a fortnight, and then one ounce a-day for the other fortnight: by following this method, a farcy which affects only the ſmall veſſels may be ſtopped in a week or ten days, and ſoon after totally eradicated.

When the farcin affects the larger blood-veſſels, the cure is more difficult; but let it always be attempted early: therefore, on the plate, thigh, or neck-veins appearing corded, bleed immediately on the oppoſite ſide, and apply the following to the corded vein.

Take oil of turpentine in a pint-bottle ſix ounces, oil of vitriol three ounces; drop the oil of vitriol into the oil of turpentine by little at a time, otherwiſe the bottle will burſt; when it has done ſmoaking, drop in more oil of vitriol, and ſo on till all is mixed.

This mixture is one of the beſt univerſals in a beginning farcy; but where it is ſeated in looſe fleſhy parts, as flanks or belly, equal parts of the oil of vitriol and turpentine are neceſſary.

Rub the parts firſt with a woollen cloth, and then apply ſome of the mixture over the buds, and whereever there is any ſwelling, twice a-day. Give the cooling phyſic every other day, and then three ounces of nitre every day for ſome time.

When the farcy begins on the flanks, or towards the lower belly, it often takes its riſe from a ſingle puncture of a ſharp ſpur. The pain and ſmarting is one ſure ſign to diſtinguiſh the farcy from common accidents; the ſtaring of the hair, which ſtands up like a tuft all round the buds or bliſters, and the matter that iſſues from the buds, which is always purulent and of a clammy greaſy conſiſtence, are other certain ſigns. After bathing with the mixture above mentioned till the ulcers are ſmooth and healing, ſhould the ſwelling not ſubſide, to prevent the ſpreading of the buds, and to diſperſe them, bathe with either of theſe mixtures as far as the centre of the belly; and at the ſame time give a courſe of antimonials as will preſently be preſcribed.

Take ſpirits of wine four ounces, oil of vitriol and turpentine of each two ounces, white-wine vinegar or verjuice ſix ounces.

Of the Farcy.

Or the following:

Take ſpirits of wine rectified four ounces, camphor half an ounce, vinegar or verjuice ſix ounces, white vitriol diſſolved in four ounces of ſpring-water one ounce: mix together.

In the lower limbs the farcy lies ſometimes concealed for a great while; and makes ſo ſlow a progreſs, that it is often miſtaken for greaſe, or for a blow or kick, and goes by the general appellation of *a humour ſettled there.* In order to diſtinguiſh the one from the other, we ſhall obſerve, that a kick or bruiſe is generally attended with a ſudden ſwelling, or a contuſed wound, which for the moſt part digeſts eaſily: the greaſe is alſo a ſmooth ſwelling that breaks out above the bending of the paſterns backwards; but the farcy begins on the paſtern joint uſually with one bud, and runs upwards like a knotty crab-tree.

Very ſimple means have ſometimes ſtopped it, before it has begun to ſpread; a poultice with bran and verjuice bound round the part and renewed once a-day will often alone ſucceed; and if proud fleſh ſhould ariſe, touch it with oil of vitriol, or aqua-fortis, an hour before you apply the poultice; for when the diſtemper is local, as we ſuppoſe it here, it is to be conquered by outward applications.

When the diſtemper grows inveterate, and reſiſts the above method, and the veſſels continue corded, Gibſon recommends the following mixture.

Take linſeed oil half a pint; oil of turpentine and ſalt-petre, of each three ounces; tincture of euphorbium and hellebore, of each two drams; the ſoldiers ointment, two ounces; or oil of bays, or oil of origanum, half an ounce: double aqua-fortis, half an ounce: after the ebullition is over, add two ounces of Barbadoes tar.

Rub this into the corded veins, and where ever there is a ſwelling, once in two or three days; but if the orifices are choked up with proud fleſh, or the ſkin ſo much thickened over the ulcers as to confine the matter, in either caſe it is neceſſary to make an open paſſage with a ſmall hot iron, and deſtroy the proud fleſh; after which it may be kept down by touching with oil of vitriol, aqua-fortis, or butter of antimony. A ſalve may be prepared with quickſilver and aqua-fortis, rubbing any quantity of the former with enough of the latter to the conſiſtence of a liniment; ſmear the ulcers with this whenever they appear foul, and you will find it preferable to moſt other eating medicines.

Our farriers, after opening the buds, put in uſually a ſmall quantity of corroſive ſublimate or arſenic, which they call *coring out the farcy;* this may anſwer where the buds are few, and not ſituated near large blood-veſſels, joints, or tendons: others uſe Roman vitriol, or ſublimate and vitriol in equal quantities; but let it be remembered, that many a horſe has been poiſoned by theſe medicines ignorantly uſed, and in too large quantities.

The following balls are proper in every ſtate of the farcy; and when the diſtemper has been in its infancy, before the ſkin was much defaced, has often cured it in a week or two, by giving them only once or twice a-day: but in an old farcy they ſhould be given for two or three months together.

Take of native cinnabar, or cinnabar of antimony, eight ounces ; long bithwort and gum guaiacum powdered, of each four ounces : make into a paſte with honey, and form into balls of the ſize of a large walnut, and roll them into liquorice-powder.

The tediouſneſs of this courſe has encouraged the giving of mercurials ; and indeed, where they are directed with ſkill, they muſt be attended with ſucceſs : the ſtronger preparations, as the red and white precipitates, and turbith, being combined with ſharp ſaline parts, may be hazardous and injurious ; but the latter given in ſmall quantities have been found very ſucceſsful in ſuch kind of inveterate diſorders. Mr Gibſon ſays, he has given it to a dram at a doſe, where the limbs have been greatly ſwelled ; that in 48 hours the ſores were all dried up, and the limbs reduced ; but that it made the horſe ſo violently ſick for ſeveral days, and ſcoured him to ſuch a degree, that it could not be repeated.

One would have thought that the ſucceſs attending this medicine ſo ſuddenly, might have encouraged Gibſon to have made further trials in ſmaller quantities ; which had he done, it is more than probable he would not have been diſappointed : for the grand ſecret in giving mercurials as alteratives, is the introducing them into the blood, without operating on the ſtomach and bowels ; and to do this effectually, they muſt be given in ſmall quantities, and ſo bridled as to controul their force on the firſt paſſages ; taken in this manner, they will mix gradually with the blood and juices, and operate both effectually and ſafely.

Dr Braken recommends the knots and chords to be rubbed with the mercurial ointment before they break in order to diſperſe them ; and after breaking, to dreſs the ſores with equal parts parts of Venice turpentine and quickſilver : if by theſe means the mouth ſhould become ſore, treat as above.—This method ſeems to be effectual, with proper care.

The following is alſo recommended by the ſame gentleman :

Take butter of antimony and bezoar mineral, of each one ounce ; beat up with half a pound of cordial ball ; and give the bigneſs of a walnut, or three quarters of an ounce, every day for two or three weeks, faſting two or three hours after it.

We ſhall here take notice of what is called the *water farcy ;* which has no reſemblance to a true farcy, either in its cauſe, ſymptoms, or effects, but has only obtained this name through cuſtom and ignorance.

This water-farcy, then, is of two kinds : one the product of a feveriſh diſpoſition, terminating on the ſkin, as often happens in epidemical colds ; the other is dropſical, where the water is not confined to the belly and limbs, but ſhews itſelf in ſeveral parts of the body by ſoft ſwellings yielding to the preſſure of the finger. This laſt kind uſually proceeds from foul feeding, or from the latter graſs and fog that often comes up in great plenty with continued cold rains, and breeds a ſluggiſh viſcid blood. In the former caſe, we have ſeen the limbs and whole body enormouſly ſwelled, and very hard, the belly and ſheath greatly diſtended ; which were as ſurpriſingly reduced in 24 hours, by ſlight ſcarifications within-ſide the leg and thigh with a ſharp penknife, and three or four ſtrokes on the ſkin of the belly on each ſide the ſheath : from theſe ſcarifications there was a conſtant and ſurpriſing large dripping of water, which ſoon relieved the horſe ; when a few purges compleated his recovery.

In the other ſpecies of dropſy the curative intentions are to diſcharge the water, recover the craſis or ſtrength of the blood, and brace up the relaxed fibres throughout the whole body. To this end, purge once a-week or ten days ; and give intermediately either of the following.

Take black hellebore freſh gathered, two pounds ; waſh, bruiſe, and boil in ſix quarts of water, to four ; and then ſtrain out the liquor, and put two quarts of white-wine on the remaining hellebore, and let it infuſe warm 48 hours : then ſtrain off, mix both together, and give the horſe a pint night and morning.

Take nitre two ounces, ſquills powdered three drams or half an ounce, camphor one dram, honey enough to form into a ball, to be given once a-day alone, or waſhed down with a horn or two of the above drink.

Before we cloſe this ſection, it is proper to lay down the ſymptoms of an incurable farcy, that the owners of ſuch horſes may ſave themſelves unneceſſary expenſe and trouble in their endeavours to obtain a cure.

When a farcy, by improper applications, or by neglect, has ſpread and increaſed, or after long continuance reſiſted the medicines above recommended ; if freſh buds are continually ſpouting forth, while the old ones remain foul and ill-conditioned ; if they riſe on the ſpines of the back and loins ; if the horſe grows hide-bound, and runs at the noſe ; if abſceſſes are formed in the fleſhy parts between the interſtices of the large muſcles ; if his eyes look dead and lifeleſs ; if he forſakes his food, and ſcours often, and his excrements appear thin and of a blackiſh colour ; if the plate or thigh vein continues large and chorded after firing and other proper applications ; theſe ſymptoms denote the diſtemper to have penetrated internally, and that it will degenerate into an incurable conſumption : it is moſt probable alſo that the whole maſs of fluids are tainted, and become irremediable by art.

Sect. XXI. *Of Alterative Medicines.*

By alteratives, or altering medicines, are to be underſtood ſuch as, having no immediate ſenſible operation, gradually gain upon the conſtitution, by changing the humours or juices from a ſtate of diſtemperature to health. This intention in ſome caſes may perhaps be effected by correcting the acrimony of the juices, and accelerating the blood's motion ; and in others by attenuating or breaking its particles, and dividing thoſe coheſions which obſtruct the capillaries or finer veſſels, and ſo promote the due ſecretions of the various fluids. It is certain, that many have but an indifferent opinion of a medicine that does not operate externally, and gratify their ſenſes with a quantity of imagined humours ejected from the body : but let ſuch people remember, that there are good humours as well as bad, which are thrown off together ; that no evacuating medicine has a power of ſelecting or ſeparating the bad from the good ; and conſequently that they are thrown out only in a proportionate quantity. Theſe few hints may be ſufficient to convince the judicious reader of the great advantages ariſing from alteratives, and the preference

Of Alterative Medicines.

ference due to them in moſt caſes over purgatives; unleſs it could be proved, as already mentioned, that the latter could cull out and ſeparate from the blood the the bad humours ſolely, leaving the good behind: but this ſelective power has long been juſtly exploded as ridiculous and uncertain; ſince it is plain, that all kinds of purging medicines differ only in degree of ſtrength, and operate no otherwiſe upon different humours than as they ſtimulate more or leſs.

We ſhall therefore take this opprrunity of recommending ſome alterative medicines which are not ſo generally known as they ought to be; and that too on the ſureſt grounds, a proper experience of their good effects in repeated trials. The firſt, then, is nitre or purified ſalt-petre; which has long been in great eſteem, and perhaps is more to be depended on in all inflammatory fevers than any other medicine whatever: but beſides this extenſive power of allaying inflammatory diſorders, it is now offered as an alterative remedy, taken in proper quantities for ſurfeits, molten-greaſe, hide-bound, greaſe-heels, &c. And as it has been known to ſucceed even in the cure of the farcy; what other diſtempers in horſes, ariſing from vitiated fluids, may it not be tried on, with a ſtrong probability of ſucceſs? This great advantage will ariſe from the uſe of this medicine over moſt others, that, as its operation is chiefly by urines, it requires no confinement or cloathing; but the horſe may be worked moderately throughout the whole courſe. This medicine has been found equally efficacious (by many trials made in one of our hoſpitals) in correcting the acrimony of the juices, and diſpoſing the moſt obſtinate and inveterate ſores to heal up; and hence probably it came recommended as an alterative to our horſes.

The quantity of nitre given at a time ſhould be from two to three ounces a-day; let it be finely powdered, and then mix with it by little at a time as much honey as will form it into a ball: give it every morning faſting for a month; or it may be given at firſt for a fortnight only, intermitting a fortnight, and then repeat it. If it be obſerved that the horſe ſhews an uneaſineſs at the ſtomach after taking it; a horn or two of any liquor ſhould be given after it, or it may be diſſolved at firſt in his water, or mixed with his corn; though the ball, where it agrees, is the eaſieſt method of giving.

When horſes take drinks with great reluctance, powders muſt be given in their feeds: thus crude antimony, or liver of antimony finely powdered, may be given to the quantity of half an ounce, night and morning; but in all ſurfeits, gum guaiacum mixed with antimony is found more efficacious. Thus,

Take of crude antimony finely powdered, or, where it can be afforded, cinnabar of antimony, and gum guaiacum, of each a pound: mix together with an oily peſtle to prevent the gum's caking: divide the whole into 32 dozes, *viz.* an ounce each doze: let one be given every day in the evening-feed.

Or, Take of cinnabar of antimony, gum guaiacum, and Caſtile or Venice ſoap, of each half a pound; ſalt of tartar, four ounces: beat them up into a maſs, and give an ounce every day. To theſe may be added very advatageouſly, an ounce and an half of camphor.

Æthiops mineral, given to the quantity of half an ounce a-day, is a very good ſweetener and corrector of the blood and juices; but it has been obſerved, after having been taken a week or ten days, to make ſome horſes ſlabber, and unable to chew their hay and oats; and the ſame ſymptoms have ariſen, where only two drams of crude mercury has been given, and continued about the ſame ſpace of time.

Of Rowelling

Diet-drinks.—1. A decoction of logwood, prepared like that of guaiacum, is alſo ſucceſsfully given in ſurfeits.

2. Lime-water prepared with ſhavings of ſaſſafras and liquorice, is a good diet-drink to ſweeten and correct a horſe's blood; and may be given with the nitre-balls for that purpoſe.

3. Tar-water alſo, as has before been hinted, may in many caſes be well worth trial: but let it be remembered, that all medicines of this kind ſhould be continued a conſiderable time in obſtinate caſes.

Sect. XXII. *Of Rowelling.*

There ſeems to be no remedy ſo much made uſe of, and ſo little underſtood by farriers in general, as rowels; for which reaſon we ſhall endeavour to ſet the whole affair in a clearer light than hitherto it has appeared in.

We ſhall begin, then, by deſcribing *rowelling;* which is an artificial vent made between the ſkin and fleſh, in order to unload and empty the veſſels in general, and thereby relieve particular parts when too much oppreſſed by a fullneſs or redundancy.

The general and abſurd reaſoning of farriers on the effects and uſe of rowelling, in ſome meaſure makes this ſection the more neceſſary, as it is too notorious how impertinently they talk on this ſubject: for in ſhort, with them, a rowel is to draw off all the bad and corrupt humours from the blood by a ſort of magic.

It is neceſſary to obſerve, that the matter generally diſcharged by a rowel, is nothing more than an ouzing from the extremities of the veſſels divided in the making of it; in fact, then, it is blood, which loſes its colour, by being ſhed out of the veſſels, by the warmth of the part, and by its confinement.

If this is granted, it will evidently appear, that the good effects enſuing from this operation muſt be owing to a gradual depletion or emptying of the veſſels in general; by which means the ſurcharge or load on a particular part is taken off and removed, and impurities or bad juices (generally called *humours*) run off with the good in proportion to their quantity in the blood.

Thus, to lean hide-bound horſes, and thoſe of a dry hot conſtitution, the diſcharge, by depriving the conſtitution of ſo much blood and fluids, is daily exhauſting the ſtrength of the animal; and may be productive of bad conſequences, by defrauding the conſtitution of a neceſſary fluid.

But in diſorders from fulneſs, attended with acrimony or ſharpneſs of the juices, and with defluxions on the eyes, lungs, or any part of conſequence; the gradual diſcharge, brough on by theſe means, will contribute to leſſen the fulneſs on the parts affected, and give the veſſels an opportunity of recovering their tone, while evacuating and alterative medicines are doing their office.

It may be neceſſary, however, to obſerve, that there is a wonderful communication between the veſſels of the cellular membrane under the ſkin, which remarkably appears, by inflating thoſe of ſheep, calves, *&c.* by the butchers: hence, probably, it is, that ſome diſorders of this integument are ſo apparently relieved by iſſues, or rowels, without our having any recourſe to that general depletion of the veſſels, we have juſt obſerved, to account for it; and hence, alſo, may be deduced their utility, ſometimes in draining off any extravaſated fluids which may lodge between the interſtices of the muſcles, after violent ſtrains of the ſhoulder; alſo in diſcharging ſuch vicious or ſharp fluids as are thrown on the membranes, and occaſion thoſe flying pains and lameneſſes which we find are often removed by this local remedy.

Sect. XXIII. *Of Strains in Various Parts.*

1. It is neceſſary to obſerve, that, in all ſtrains, the muſcular or tendinous fibres are overſtretched; and ſometimes ruptured, or broke. To form, therefore, a true idea of theſe diſorders, let us firſt conſider every muſcle and tendon as compoſed of ſpringy elaſtic fibres, which have a proper power of their own to contract and extend themſelves; or, to make their action more familiar, let us compare them to a piece of catgut, that we may the better judge with what propriety oily medicines are directed for their cure. Thus, then, if, by a violent extenſion of this catgut, you had ſo overſtretched it as to deſtroy its ſpringineſs or elaſticity, and was inclined to recover its loſt tone, would you for that purpoſe think of ſoaking it in oil? And is not the method of treating ſtrains, or overſtretched muſcles and tendons, full as prepoſterous, when you bathe or ſoak them in oily medicines, at a time that they want reſtringents to brace them up? Yet cuſtom has ſo eſtabliſhed this practice, and fallacious experience ſeemingly ſo confirmed it, that it would be a difficult taſk to convince the illiterate and prejudiced of the abſurdity, who, by attributing effects to wrong cauſes, are led into this error, and the oils uſurp the reputation that is due only to reſt and quiet: they ſeem, however, to be aware of the ill conſequences, by their adding the hot oils, as ſpike, turpentine, and origanum; which, though they in ſome meaſure guard againſt the too ſuppling quality of the other oils, yet the treatment is ſtill too relaxing to be of real ſervice.

2. And indeed, in all *violent* ſtrains of either tendons or muſcles, whatever opinion we may entertain of bathing and anointing with favourite noſtrums, which often ſucceed in ſlight caſes, where perhaps bandage alone would have done; yet it is the latter, with proper reſting the relaxed fibres till they have thoroughly recovered their tone, that are the chief things to be depended on; and frequently ſome months neceſſary for effecting the cure.

3. All violent ſtrains of the ligaments, which connect the bones together, eſpecially thoſe of the thigh, require time, and turning out to graſs, to a perfect recovery. External applications can avail but little here, the parts affected lying too deep, and ſo ſurrounded with muſcles that medicine cannot penetrate to them. The ſooner, in theſe caſes, a horſe is turned out to graſs, the better; as the gentle motion in the field will prevent the ligaments and joint-oil from thickening, and of courſe the joint itſelf from growing ſtiff.

4. When a horſe's ſhoulder is overſtrained, he does not put out that leg as the other; but, to prevent pain, ſets the ſound foot hardily on the ground to ſave the other; even though he be turned ſhort on the lame ſide, which motion tries him the moſt of any. When trotted in hand, inſtead of putting his leg forward in a right line, he forms a circle with the lame leg; and when he ſtands in the ſtable, that leg is advanced before the other.

5. In order to cure this lameneſs, firſt bleed him, and let the whole ſhoulder be well bathed three times a-day with hot verjuice or vinegar, in which may be diſſolved a piece of ſoap; but if the lameneſs continues without ſwelling, or inflammation, after reſting two or three days, let the muſcles be well rubbed for a conſiderable time, to make them penetrate, with good opodeldoch, or either of the following mixtures:

Take camphorated ſpirit of wine, two ounces; oil of turpentine, one ounce; this proportion will prevent the hair coming off.

Or, Take the beſt vinegar, half a pint; ſpirit of vitriol, and camphorated ſpirit of wine, of each two ounces.

6. When the ſhoulder is very much ſwelled, it ſhould be fomented with woollen cloths (large enough to cover the whole) wrung out of hot verjuice and ſpirit of wine; or a fomentation prepared with a ſtrong decoction of wormwood, bay-leaves, and roſemary, to a quart of which may be added half a pint of ſpirit of wine.

7. A rowel in the point of the ſhoulder in this caſe often does great ſervice; eſpecially if the ſtrain has been very violent, and the ſwelling very large: but as to boring up the ſhoulder with a hot iron, and afterwards inflating it, it is both a cruel and abſurd treatment: and the pegging up the ſound foot, or ſetting on a patten ſhoe, to bring the lame ſhoulder on a ſtretch, is a moſt prepoſterous practice, and directly calculated to render a horſe incurably lame; for it can only be neceſſary in caſes the very oppoſite to this, where the muſcles have been long contracted, and we want to ſtretch them out.

8. Where poultices can be applied, they are at firſt undoubtedly very effectual, after bathing with hot vinegar or verjuice; and are to be preferred greatly to cold charges, which, by drying ſo ſoon on the part, keep it ſtiff and uneaſy: let them be prepared with oatmeal, rye flour, or bran boiled up in vinegar, ſtrong-beer or red-wine lees, with lard enough to prevent their growing ſtiff; and when by theſe means the inflammation and ſwelling is brought down, bathe the part twice a-day with either of the above mixtures, opodeldoch, or camphorated ſpirit of wine; and roll the part three or four inches, both above and below, with a ſtrong linen roller, of about two fingers width; which contributes not a little to the recovery, by bracing up the relaxed tendon; and perhaps is more to be depended on than the applications themſelves.

9. In ſtrains of the *coffin joint*, that have not been diſcovered in time, there will grow ſuch a ſtiffneſs in the joint, that the horſe will only touch the ground with his toe; and the joint cannot be played with the hand: the only method here is repeated bliſtering, and then firing ſuperficially.

10. Strains of the *back ſinews* are very common; and are eaſily diſcovered by the ſwelling, which extends ſometimes from the back-ſide of the knee down to the heel, but for the moſt part the horſe ſets that foot before the other. The tendon ſhould be well bathed three

Of Strains.

or four times a-day with hot vinegar; and if much ſwelled, apply the poultices above recommended; and when the ſwelling is down, bathe with the mixtures above, or with camphorated ſpirit of wine and oil of amber, in which is diſſolved as much camphor as the ſpirits will take up; and roll up the tendon with a proper bandage, or laced ſtocking; which laſt, properly fitted to the limb, might be wore to great advantage, not only in theſe ſort of injuries, but in moſt others, where there is a diſpoſition to the greaſe, or other ſwellings of the limbs, from weak and relaxed fibres. Curriers ſhavings wetted with vinegar have been found uſeful for this purpoſe; as has alſo tar and ſpirit of wine: but where the tendons have ſuffered by repeated injuries of this kind, the caſe will demand bliſtering, firing, and proper reſt.

11. Strains of the *knees* and *paſterns* ariſe frequently from kicks or blows: if they are much ſwelled, apply firſt the poultices; and when the ſwelling is abated, bathe with the above, or the following.

Take vinegar, one pint; camphorated ſpirit of wine, four ounces; white vitriol, diſſolved in a little water, two drams.

Or, Take the white of three or four eggs, beat them into a froth with a ſpoon; to which add an ounce of rock alum, finely powdered; ſpirit of turpentine, and wine, of each half an ounce; mix them well together.

12. As great weakneſs remains in the paſterns after violent ſtrains, the beſt method is to turn the horſe out to graſs till he is perfectly recovered; when this cannot be complied with, the general way is to bliſter and fire.

13. When a horſe is lame in the *ſtifle*, he generally treads on his toe, and cannot ſet the heel to the ground. Treat him at firſt with the vinegar and cooling reſtringents: but if a large ſwelling, with puffineſs, enſues, foment it well with the diſcutient fomentation till it diſperſes; and then bathe the part with any of the above medicines.

14. A lameneſs in the *whirl-bone* and hip, is diſcovered by the horſe's dragging his leg after him, and dropping backward on his heel when he trots. If the muſcles of the hip are only injured, this kind of lameneſs is cured eaſily; but when the ligaments of the joint are affected, the cure is often very difficult, tedious, and uncertain. In either caſe, at firſt bathe the parts well with the cooling medicines, four or five times a-day: in the muſcular ſtrain, this method alone may ſucceed; but in the ligamentous, it is reſt and time only can reſtore the injured parts to their proper tone.

15. Strains in the *hock* are to be treated by ſoaking the parts with coolers and repellers; but when the ligaments are hurt, and they are attended with great weakneſs and pain, uſe the fomentation. If a hardneſs ſhould remain on the outſide, it may be removed by repeated bliſtering; if within, it may be out of the power of any external applications to remove: however, the joint ſhould be fired gently with ſmall razes or lines pretty cloſe together, and then covered with a mercurial plaſter. To the diſcutient fomentation above mentioned may be added crude ſal armoniac, with a handful of wood-aſhes boiled in it.

16. The bliſtering ointment for the above purpoſes may be found in the Section of *Bone-ſpavin*; but the ſublimate ſhould be omitted.

17. The *firing*, uſed for the ſtrengthening relaxed ſinews or tendons, ſhould act only on the ſkin, which, by contracting and hardening it all round the ſinews, compreſſes them more firmly like a bandage. The bowmen of old ſubmitted to this operation, in order to give ſtrength to the muſcles and tendons of their arms. A proper degree of ſkill is very requiſite to perform it effectually on a horſe; for a due medium ſhould be obſerved, and the inſtrument neither ſo ſlightly applied as to ſcarify the ſkin only ſuperficially, nor ſo deep as to wound or cauterize the ſinew or its ſheath. The lines ſhould be drawn pretty cloſe together, on each ſide of the joint or ſinew, following the courſe of the hair; no croſs lines ſhould be made, as they but diſfigure the horſe afterwards, without any real uſe. The firing inſtrument, or knife, ought to be a little rounded on the edge, gradually thickening to the back, that it may retain the heat for ſome time, but ſhould not be applied till the flaming redneſs is partly gone off. The cauterized parts may be bathed with ſpirit of wine at firſt; and anointed afterwards with bees-wax and oil, which alone is ſufficient to complete the cure.

Sect. XXIV. *Of Tumours and Impoſthumes.*

Of Tumours.

Tumours, or ſwellings, ariſe either from external injuries, or internal cauſes.

Swellings cauſed by external accidents, as blows and bruiſes, ſhould at firſt be treated with reſtringents; Thus, let the part be bathed frequently with hot vinegar or verjuice; and, where it will admit of bandage, let a flannel wetted with the ſame be rolled on: if by this method the ſwelling does not ſubſide, apply, eſpecially on the legs, a poultice with red-wine lees, ſtrong-beer grounds, and oatmeal, or with vinegar, oil, and oatmeal: either of theſe may be continued twice a-day, after bathing, till the ſwelling abates; when, in order to diſperſe it entirely, the vinegar ſhould be changed for camphorated ſpirit of wine, to four ounces of which may be added one of ſpirit of ſal armoniac; or it may be bathed with a mixture of two ounces of crude ſal armoniac boiled in a quart of chamber-ley twice a-day, and rags dipped in the ſame may be rolled on.

Fomentation made by boiling wormwood, bay-leaves, and roſemary, and adding a proper quantity of ſpirits, are often of great ſervice to thin the juices, and fit them for tranſpiration; eſpecially if the injury has affected the joints.

But in bruiſes, where the extravaſated blood will not by theſe means be diſperſed, the ſhorteſt way is to open the ſkin, and let out the grumes.

Critical tumours, or ſwellings, which terminate fevers, ſhould by no means be diſperſed; except when they fall on the paſtern or coffin joint, ſo as to endanger them: in this caſe the diſcutient fomentation, (p. 25. col. 2.) ſhould be applied three or four times a-day, and a cloth or flannel frequently wrung out of the ſame ſhould be bound on, in order to keep the joint continually breathing.

But if the ſwelling fixes under the jaws, behind the ears, on the poll, withers, or in the groins and ſheath, &c. it ſhould be encouraged and forwarded by ripening poultices wherever they can be applied; oatmeal

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boiled ſoft in milk, to which a proper quantity of oil and lard is added, may anſwer this purpoſe; or the poultice recommended in the Section of *Strangles:* theſe muſt be applied twice a-day, till the matter is perceived to fluctuate under the fingers, when it ought to be let out; for which purpoſe, let the tumour be opened with a knife or ſtrong lancet, the whole length of the ſwelling, if it can be done ſafely; for nothing contributes ſo much to a kind healing, as the matter's having a free diſcharge, and the opening's being big enough to dreſs to the bottom.

Pledgets of tow, ſpread with black or yellow baſilicon (or the wound ointment), and dipped in the ſame, melted down with a fifth part of oil of turpentine, ſhould be applied to the bottom of the ſore, and filled up lightly with the ſame, without cramming: it may be thus dreſſed once or twice a-day, if the diſcharge is great, till a proper digeſtion is procured; when it ſhould be changed for pledgets ſpread with the red precipitate ointment, applied in the ſame manner.

Should the ſore not digeſt kindly, but run a thin water and look pale, foment, as often as you dreſs, with the above fomentation; and apply over your dreſſing the ſtrong-beer poultice, and continue this method till the matter grows thick, and the ſore florid.

The following ointments will generally anſwer your expectations in all common caſes; and may be prepared without, as well as with, the verdigreaſe.

Take Venice turpentine and bees-wax of each a pound, oil of olives one pound and a half, yellow roſin 12 ounces; when melted together, two or three ounces of verdigreaſe, finely powdered, may be ſtirred in, and kept ſo till cold, to prevent its ſubſiding.

Take of yellow baſilicon, or the above ointment, without verdigreaſe, four ounces; red precipitate, finely powdered, half an ounce: mix them together cold with a knife or ſpatula.

This laſt, applied early, will prevent a fungus, or proud fleſh, from ſhooting out: for if you dreſs too long with the above digeſtive, the fungus will riſe faſt, and give ſome trouble to ſuppreſs it; when it will be neceſſary to waſh the ſore, as often as you dreſs, with a ſolution of blue vitriol in water, or to ſprinkle it with burnt alum and precipitate. If theſe ſhould not be powerful enough, touch with a cauſtic, or waſh with the ſublimate water made by diſſolving half an ounce of corroſive ſublimate in a point of lime-water.

But this trouble may in a great meaſure be prevented, if the ſore is on a part where bandages can be applied with compreſſes of linen cloth: for even when theſe excreſcences regerminate, as it were, under the knife, and ſpring up in ſpite of the cauſtics above mentioned, they are to be ſubdued by moderate compreſſion made on the ſprouting fibres by theſe means.

Authors on farriery have given in general very proper receipts to anſwer every intention of this kind by medicines: but as they have not laid down ſufficient rules for their application in thoſe caſes where they are moſt wanted, the following general directions will not be unacceptable; as the difficulty in healing ſome kinds of ſores ariſes frequently from the unſkilful manner of dreſſing them.

Of Wounds

It may be neceſſary then to obſerve here, once for all, that the cures of moſt ſores are effected by the ſimpleſt methods; and that it is often of much more conſequence to know how to dreſs a ſore, than what to dreſs it with. And in this conſiſts indeed the chief art of this branch of ſurgery: for the moſt eminent in that profeſſion have long ſince diſcovered, that variety of ointments and ſalves are unneceſſary in the cure of moſt wounds and ſores; and they have accordingly diſcarded the greateſt part formerly in repute for that purpoſe; repeated obſervations having taught them, that, after the digeſtion, nature is generally diſpoſed to heal up the wound faſt enough herſelf; and that the ſurgeon's chief care is to prevent a luxuriancy, commonly called *proud fleſh;* which all ointments, wherein lard or oil enters, are but too prone to encourage, as they keep the fibres too lax and ſupple; and which dry lint alone, early applied, as eaſily prevents, by its abſorbing quality, and light compreſſion on the ſprouting fibres.

Thus, if a hollow wound or ſore is crammed with tents, or the dreſſings are applied too hard, the tender ſhoots of fleſh from the bottom are prevented puſhing up; and the ſides of the ſore from this diſtenſion may in time grow horny and turn fiſtulous; nor has the matter by this method a free diſcharge.

On the other hand, if ſores of any depth are dreſſed ſuperficially, the external parts being more diſpoſed to heal and come together than the internal, they will fall into contact, or heal too ſoon; and the ſore, not filling up properly from the bottom, will break out afreſh.

Hence we may juſtly conceive how little ſtreſs is to be laid on famous ointments, or family ſalves, unſkilfully applied; for unleſs this due medium is obſerved, or obtained in the dreſſing, no hollow ſore can heal up properly.

As ſoon then as a good digeſtion is procured (which is known by the thickneſs and whiteneſs of the matter diſcharged, and the florid red colour at the bottom of the ſore) let the dreſſings be changed for the precipitate medicine; or the ſore may be filled up with dry lint, alone, or dipped in lime-water with a little honey and tincture of myrrh, or brandy, about a fifth part of the latter to one of the former: a pledget of lint, dipped in this mixture ſhould alſo be applied to the bottom of the ſore, which ſhould be filled up with others to the ſurface or edges, but not crammed in too hard, as before obſerved, nor yet applied too looſely.

By this method, the ſore would incarn, or heal up properly, and ſoft ſpongy fleſh would be prevented or ſuppreſſed in time; whereas when ointments or ſalves are too long continued, a fungus, or proud fleſh, is thereby ſo encouraged in its growth, that it requires ſome time to deſtroy and eat it down again: a proper compreſs of cloth, and a linen roller, is abſolutely neceſſary both for this purpoſe, and to ſecure on the dreſſings, wherever they can conveniently be applied.

Sect. XXV. *Of Wounds in general.*

In all freſh wounds made by cutting inſtruments, there is nothing more required than bringing the lips of the wound into contact by ſuture or bandage, provided the part will allow of it; for on wounds of the hips, or other prominent parts, and acroſs ſome of the large muſcles, the ſtitches are apt to burſt on the horſe's lying down and riſing up in the ſtall. In ſuch caſes, the lips ſhould not be brought cloſe together: one ſtitch is ſufficient for a wound two inches long : but in large wounds, they ſhould be at an inch or more diſtance ; and if the wound is deep in the muſcles, care ſhould be taken to paſs the needles proportionably deep, otherwiſe the wound will not unite properly from the bottom.

Should the wound bleed much from an artery divided, the firſt ſtep ſhould be to ſecure it, by paſſing a crooked needle underneath, and tying it up with a waxed thread: if the artery cannot be got at this way, apply a button of lint or tow to the mouth of the bleeding veſſels, dipped in a ſtrong ſolution of blue vitriol, ſtyptic water, oil of vitriol, or hot oil of turpentine, powdered vitriol, or colcothar, *&c.* and remember always to apply it cloſe to the mouth of the bleeding veſſels, and take care that it is kept there by proper compreſs and bandage till an eſchar is formed ; otherwiſe it will elude your expectations, and frequently alarm you with freſh bleedings.

In a memoir preſented to the Royal Academy of Sciences by M. La Foſſe, he gives an account of the ſucceſs he had met with in ſtopping the bleedings of very conſiderable arteries in horſes, by the application of the powder of puff-balls, the arteries cicatrizing by this means only, without any ſucceeding hæmorrhage. The lycoperdon, or puff-ball, was made uſe of for this purpoſe in human ſubjects, about 170 years ago, by Felix Wurtz, a famous old ſurgeon in Germany ; but he does not ſeem to have thought of truſting to it in ſuch conſiderable arteries as M. La Foſſe mentions, *viz.* thoſe of the leg and thigh, the bleedings from which divided veſſels he ſtopt in a few minutes by the uſe of this powder only. The agaric of the oak may alſo be uſed for this purpoſe, where it can be retained by a proper bandage.

Theſe applications, as indeed all ſtyptics, ſeem to act by conſtringing the extremity of the veſſel, or choaking it up, till a grume of blood is formed internally, which plugs up the orifice ; and has been found to adhere to it ſo as to conſtitute one body with the veſſel.

We avoid ſetting down any famous receipts for freſh wounds, whether ointments, or Friar's balſams, being well aſſured, that, in a healthy ſound conſtitution, nature furniſhes the beſt balſam, and performs herſelf the cure, which is ſo often attributed to the medicine ; when it is otherwiſe, and the blood is deprived of its balſamic ſtate, as will appear from the aſpect of the wound and its manner of healing, it muſt be rectified by proper internal medicines, before a good foundation for healing can be laid by any external application whatever.

The lips of the wound then being brought together by the needle or bandage, it needs only to be covered with rags dipped in brandy, or a pledget of tow ſpread with the wound ointment, (ſee p. 27. col. 1.) the directions in the preceding ſections being obſerved and the wounded part kept as much as poſſible from motion.

Punctured wounds from thorns, or any other accidents, ſhould be treated in the ſame manner ; applying the beer or bread and milk poultice over the dreſſing, till ſome ſigns of digeſtion appear ; and fomenting the part well every day. This method is alſo very ſucceſsfully uſed to thoſe ſwellings which often ariſe on the neck from bleeding ; the ſores being ſprinkled with precipitate, and burnt alum powdered, to fetch out the core, or fungus, which choaks up the orifice. The uſual method is to introduce a piece of vitriol, or ſublimate, which often brings on a plentiful diſcharge, fetches out the core, and makes a cure ; but it is often with the loſs of the vein, and it ſometimes leaves a large ſwelling and impoſthumation.

In gun-ſhot wounds, when the ball has not penetrated too deep, it ſhould be extracted, if it can be fetched away without diſturbance, together with any extraneous bodies that might paſs in with it ; the wound ſhould be dreſſed with the old digeſtive of Venice or common turpentine, divided with the yolks of eggs, to which may be added ſome honey and tincture of myrrh. The entrance of theſe wounds frequently requires to be enlarged, and a depending orifice ſhould always be procured if poſſible ; and if the wound ſhould not digeſt kindly, apply the beer poultice, and foment with the diſcutient fomentation before mentioned.

In ſcalds, or burns from gun-powder, or any other cauſe, when the ſkin remains entire, bathe the part well, and keep it ſoaked with rags dipped in ſpirit of wine camphorated : ſalt bound thick on the part has been found very effectual for this purpoſe ; and indeed all ſaline and ſpirituous applications excel others, while the ſkin is yet unbroke ; but when the ſkin is ſeparated, anoint the part, and keep it conſtantly ſupple with linſeed or ſalad oil, and a plaſter ſpread with bees-wax and oil ; if the ſkin is ſo ſcorched, that ſloughs muſt be digeſted out, dreſs with the wound-ointment and oil of turpentine, and finiſh the cure with any drying ointment. Should the horſe be feveriſh from the pain, bleed him, give cooling glyſters, and treat him as we have directed in ſimple fevers.

Sect. XXVI. *Of Ulcers in General.*

We ſhall not here enter into a deſcription of each particular ſpecies of ulcers, but only lay down ſome directions for their general treatment ; by which means we ſhall avoid the uſual prolixity of authors on this ſubject, and yet give ſo general an idea of the nature of ulcers, as we hope will be ſufficiently inſtructive both of the application and of the proper remedy to each.

It may be neceſſary to obſerve, that we may often in vain purſue the beſt methods of cure by external applications, unleſs we have recourſe to proper internal remedies ; for as all ulcers, difficult to heal, proceed from a particular indiſpoſition of the blood and juices, before the former can be brought into any order, the latter muſt be corrected by alteratives and ſweetening medicines.

The firſt intention in the cure of ulcers is bringing them to digeſt, or diſcharge a thick matter ; which will, in general, be effected by the green ointment, or that with precipitate ; but ſhould the ſore not digeſt kindly by theſe means, but diſcharge a gleety thin matter, and look pale, you muſt then have recourſe to warmer dreſſings, ſuch as balſam, or oil of turpentine, melted down with your common digeſtive, and the ſtrong-beer poultice over them ; it is proper alſo in theſe kind of ſores where the circulation is languid, and the natural heat abated, to warm the part, and quicken

Of Ulcers.

quicken the motion of the blood, by fomenting it well at the time of dreſſing; which method will thicken the matter, and rouſe the native heat of the part, and then the former dreſſings may be re-applied.

If the lips of the ulcer grow hard or callous, they muſt be pared down with a knife, and afterwards rubbed with the cauſtic.

Where ſoft fungous fleſh begins to riſe, it ſhould carefully be ſuppreſſed in time, otherwiſe the cure will go on but ſlowly: if it has already ſprouted above the ſurface, pare it down with a knife, and rub the remainder with a bit of cauſtic; and to prevent its riſing again, ſprinkle the ſore with equal parts of burnt alum and red precipitate; or waſh with the ſublimate water, and dreſs with dry lint even to the ſurface, and then roll over a compreſs of linen as tight as can be borne; for a proper degree of preſſure, with mild applications, will always oblige theſe ſpongy excreſcences to ſubſide, but without bandage the ſtrongeſt will not ſo well ſucceed.

All ſinuſes, or cavities, ſhould be laid open as ſoon as diſcovered, after bandages have been ineffectually tried: but where the cavity penetrates deep into the muſcles, and a counter opening is impracticable or hazardous; where, by a continuance, the integuments of the muſcles are conſtantly dripping and melting down; in theſe caſes injections may be uſed, and will frequently be attended with ſucceſs. A decoction of colcothar boiled in forge-water; or ſolution of lapis medicamentoſus in lime-water, with a fifth part of honey and tincture of myrrh, may be firſt tried, injected, three or four ounces twice a-day; or ſome reſin, melted down with oil of turpentine, may be uſed for this purpoſe: if theſe ſhould not ſucceed, the following, which is of a ſharp and cauſtic nature, is recommended on Mr Gibſon's experience.

Take of Roman vitriol half an ounce; diſſolve in a pint of water; then decant and pour off gently into a large quart-bottle: add half a pint of camphorated ſpirit of wine, the ſame quantity of the beſt vinegar, and two ounces of Egyptiacum.

This mixture is alſo very ſucceſsfully applied to ulcerated greaſy heels, which it will both cleanſe and dry up.

Theſe ſinuſes, or cavities, frequently degenerate into *fiſtulæ*, that is, grow pipey, having the inſide thickened, and lined, as it were, with a horny callous ſubſtance. In order to their cure, they muſt be laid open, and the hard ſubſtance all cut away; where this is impracticable, ſcarify them well, and truſt to the precipitate medicine made ſtrong, rubbing now and then with cauſtic, butter of antimony, or equal parts of quickſilver and aquafortis.

When a rotten or foul bone is an attendant on an ulcer, the fleſh is generally looſe and flabby; the diſcharge oily, thin, and ſtinking; and the bone diſcovered to be carious, by its feeling rough to the probe paſſed thro' the fleſh for that purpoſe. In order to a cure, the bone muſt be laid bare, that the rotten part of it be removed: for which purpoſe, deſtroy the looſe fleſh, and dreſs with dry lint; or the doſſils may be preſſed out of tincture of myrrh or euphorbium. The throwing off the ſcale is generally a work of nature, which is effected in more or leſs time, and in proportion to the depth the bone is affected; though burning the foul bone is thought by ſome to haſten its ſeparation.

Of Bone-Spavin.

Where the cure does not properly ſucceed, mercurial phyſic ſhould be given, and repeated at proper intervals: and to correct and mend the blood and juices, the antimonial and alterative powders, with a decoction of guaiacum and lime waters, are proper for that purpoſe.

Sect. XXVII. *Of a Bone-Spavin.*

Without entering at all into the cauſe of this diſorder, which is a bony excreſcence, or hard ſwelling, growing on the inſide of the hock of a horſe's leg, we ſhall content ourſelves with deſcribing the different kinds thereof by their ſymptoms, and then enter on their cure.

A ſpavin, that begins on the lower part of the hock, is not ſo dangerous as that which puts out higher, between the two round proceſſes of the leg-bone; and a ſpavin near the edge is not ſo bad as that which is more inward toward the middle, as it does not ſo much affect the bending of the hock.

A ſpavin, that comes by a kick or blow, is at firſt no true ſpavin, but a bruiſe on the bone, or membrane which covers it; therefore not of that conſequence, as when it proceeds from a natural cauſe: and thoſe that put out on colts, and young horſes, are not ſo bad as thoſe that happen to horſes in their full ſtrength and maturity; but in very old horſes they are generally incurable.

The uſual method of treating this diſorder is by bliſters and firing; without any regard to the ſituation, or cauſe whence it proceeds. Thus, if a fulneſs on the fore-part of the hock comes upon hard riding, or any other violence, which threatens a ſpavin; in that caſe, ſuch coolers and repellers are proper, as are recommended in ſtrains and bruiſes. Thoſe happening to colts and young horſes are generally ſuperficial, and require only the milder applications; for it is better to wear them down by degrees, than to remove them at once by ſevere means.

Various are the preſcriptions for the bliſtering ointment; but the following, on proper experience, ſtands well recommended by Mr Gibſon.

Take nerve and marſh-mallow ointment, of each two ounces; quickſilver, one ounce, thoroughly broke with an ounce of Venice turpentine; Spaniſh flies powdered, a dram and a half; ſublimate, one dram; oil of origanum, two drams.

The hair is to be cut as cloſe as poſſible, and then the ointment applied pretty thick over the part; this ſhould be done in the morning, and the horſe kept tied up all day without any litter till night; when he may be untied, in order to lie down; and a pitch or any ſticking plaſter may be laid over it, and bound on with a broad tape or bandage to keep all cloſe.

After the bliſter has done running, and the ſcabs begin to dry and peel off, it may be applied a ſecond time, in the ſame manner as before; this ſecond application generally taking greater effect than the firſt, and in colts and young horſes makes a perfect cure.

When the ſpavin has been of long ſtanding, it will require to be renewed, perhaps, five or ſix times: but after the ſecond application, a greater diſtance of time muſt be allowed, otherwiſe it might leave a ſcar, or cauſe a baldneſs; to prevent which, once a-fortnight

or

Of a Curb, &c.

or three weeks is often enough ; and it may in this manner be continued ſix or ſeven times, without the leaſt blemiſh, and will generally be attended with ſucceſs.

But the ſpavins that put out on older or full-aged horſes are apt to be more obſtinate, as being ſeated more inward ; and when they run among the ſinuoſities of the joint, they are for the moſt part incurable, as they then lie out of the reach of applications, and are arrived to a degree of impenetrable hardneſs.

The uſual method in theſe caſes is to fire directly, or to uſe the ſtrongeſt kind of cauſtic bliſters ; and ſometimes to fire and lay the bliſter immediately over the part : but this way ſeldom ſucceeds farther than putting a ſtop to the growth of the ſpavin, and is apt to leave both a blemiſh and ſtiffneſs behind ; beſides the great riſk run (by applications of theſe fiery and cauſtic medicines to the nervous and tendinous parts about the joints) of exciting violent pain and anguiſh, and deſtroying the limb.

The beſt and ſafeſt way, therefore, is to make trial of the bliſtering ointment above, and to continue it according to the directions there laid down, for ſome months, if found neceſſary ; the horſes in the intervals working moderately : the hardneſs will thus be diſſolved by degrees, and wear away inſenſibly.

Where the ſpavin lies deep, and runs ſo far into the hollow of the joint that no application can reach it, neither firing nor medicines can avail, for the reaſons above-mentioned ; though bold ignorant fellows have ſometimes ſucceeded in caſes of this ſort (by men of judgment deemed incurable) by the application of cauſtic ointments with ſublimate, which act very forcibly, enter deep, and make a large diſcharge, and by that means deſtroy a great part of the ſubſtance, and diſſolve away the remainder : though, whoever is at all acquainted with the nature of theſe medicines, muſt know how dangerous in general their operation is on theſe occaſions ; and that a proper prepared cautery made like a fleam, under the direction of a ſkilful hand, may be applied with leſs danger of injuring either tendons or ligaments. After the ſubſtance of the ſwelling has been properly penetrated by the inſtrument, it muſt be kept running by the precipitate medicine, or mild bliſtering ointment. Where the ſpavin lies not deep in the joint, and the bliſtering method will not ſucceed, the ſwelling may be ſafely fired with a thin iron forced pretty deep into the ſubſtance, and then ſhould be dreſſed as is above directed.

SECT. XXVIII. *Of a Curb and Ring-bone.*

1. As a ſpavin riſes among the bones on the fore-part of the hock, ſo a curb takes its origin from the junctures of the ſame bones, and riſes on the hind-part, forming a pretty large tumour over the back part of the hind-leg, attended with ſtiffneſs, and ſometimes with pain and lameneſs.

A curb proceeds from the ſame cauſes that produce ſpavins ; viz. hard riding, ſtrains, blows, or kicks. The cure at firſt is generally eaſy enough effected by bliſtering, repeated two or three times, or oftener. If it does not ſubmit to this treatment, but grows exceſſively hard, the quickeſt and ſureſt way is to fire with a thin iron, making a line down the middle from top to bottom, and drawing ſeveral lines in a penniform manner pretty deep ; and then to apply a mild bliſtering plaſter or ointment over it.—This method will entirely remove it.

There is another ſwelling taken notice of on the outſide of the hock, which is called a *jardon*. This commonly proceeds from blows and kicks of other horſes ; but frequently happens to menaged horſes, by ſetting them on their haunches : it is ſeldom attended with much lameneſs, unleſs it has been neglected, or ſome little proceſs of the bone be broke. It ſhould firſt be treated with the coolers and repellers in ſect. xxxi. : but if any ſwelling continues hard, and inſenſible, the beſt way is to bliſter or fire ; but the mild bliſters alone generally ſucceed.

2. The *ring-bone* is a hard ſwelling on the lower part of the paſtern, which generally reaches half-way round the fore-part thereof, and from its reſemblance to a ring has its denomination. It often ariſes from ſtrains, &c. ; and, when behind, from putting young horſes too early upon their haunches ; for in that attitude a horſe throws his whole weight as much, if not more, upon his paſterns, than on his hocks.

When it appears diſtinctly round the paſtern, and does not run downwards toward the coronet, ſo as to affect the coffin-joint, it is eaſily cured : but if it takes its origin from ſome ſtrain or defect in the joint originally, or if a calloſity is found under the round ligament that covers that joint, the cure is generally dubious, and ſometimes impracticable ; as it is apt to turn to a quittor, and in the end to form an ulcer upon the hoof.

The ring-bones that appear on colts and young horſes, will often inſenſibly wear off of themſelves, without the help of any application ; but when the ſubſtance remains, there needs no other remedy beſides bliſtering, unleſs when by long continuance it is grown to an obſtinate hardneſs, and then it may require both bliſtering and firing.

To fire a ring-bone ſucceſsfully, let the operation be performed with a thinner inſtrument than the common one, and let the lines or razes be made not above a quarter of an inch diſtant, croſſing them obliquely, ſomewhat like a chain : apply a mild bliſter over all, and, when quite dried up, the rupture-plaſter ; and then turn the horſe to graſs for ſome time.

Of Splents.

SECT. XXIX. *Of Splents.*

THESE are hard excreſcences that grow on the ſhank-bone, and are of various ſhapes and ſizes. Some horſes are more ſubject to ſplents than others ; but young horſes are moſt liable to theſe infirmities, which often wear off and diſappear of themſelves. Few horſes put out ſplents after they are ſeven or eight years old, unleſs they meet with blows or accidents.

A ſplent that ariſes in the middle of the ſhank-bone is nowiſe dangerous ; but thoſe that ariſe on the back part of this bone, when they grow large and preſs againſt the back ſinew, always cauſe lameneſs or ſtiffneſs, by rubbing againſt it : the others, except they are ſituated near the joints, ſeldom occaſion lameneſs.

As to the cure of ſplents, the beſt way is not to meddle with them, unleſs they are ſo large as to diſfigure a horſe, or are ſo ſituated as to endanger his going lame.

Splents in their infancy, and on their firſt appearance,

ance, ſhould be well bathed with vinegar, or old verjuice; which, by ſtrengthening the fibres, often put a ſtop to their growth: for the membrane covering the bone, and not the bone itſelf, is here thickened; and in ſome conſtitutions purging, and afterwards diuretic drinks, will be a great means to remove the humidity and moiſture about the limbs, which is what often gives riſe to ſuch excreſcences.

Various are the remedies preſcribed for this diſorder; the uſual way is to rub the ſplent with a round ſtick or the handle of a hammer, till it is almoſt raw, and then touch it with oil of origanum. Others lay on a pitch-plaſter, with a little ſublimate, or arſenic, to deſtroy the ſubſtance; ſome uſe oil of vitriol; ſome tincture of cantharides: all which methods have at times ſucceeded; only they are apt to leave a ſcar, with the loſs of hair. Thoſe applications that are of a more cauſtic nature often do more hurt than good, eſpecially when the ſplent is grown very hard, as they produce a rottenneſs, which keeps running ſeveral months before the ulcer can be healed, and then leaves an ugly ſcar.

Mild bliſters often repeated, as recommended in the ſection upon the *Bone Spavin*, ſhould firſt be tried as the moſt eligible method; and will generally ſucceed, even beyond expectation: but if they fail, and the ſplent be near the knee or joints, you muſt fire and bliſter in the ſame manner as for the bone-ſpavin.

Splents on the back part of the ſhank-bone are difficult to cure, by reaſon of the back ſinews covering them: the beſt way is to bore the ſplent in ſeveral places with an iron not very hot; and then to fire in the common way, not making the lines too deep, but very cloſe together.

SECT. XXX. *Of the Poll-evil.*

The poll-evil is an abſceſs near the poll of a horſe, formed in the ſinuſes between the poll-bone and the uppermoſt vertebræ of the neck.

If it proceeds from blows, bruiſes, or any external violence, at firſt bathe the ſwelling often with hot vinegar; and if the hair be fretted off with an ouzing thro' the ſkin, make uſe of two parts of vinegar, and one of ſpirit of wine; but if there be an itching, with heat and inflammation the ſafeſt way is to bleed, and apply poultices with bread, milk, and elder flowers: this method, with the aſſiſtance of phyſic, will frequently diſperſe the ſwelling and prevent this evil.

But when the tumour is critical, and has all the ſigns of matter, the beſt method then is to forward it by applying the ripening poultices already taken notice of, till it comes to maturity, and burſts of itſelf; or if opened with a knife, great care ſhould be taken to avoid the tendinous ligament that runs along the neck under the mane; when matter is on both ſides, the opening muſt be made on each ſide, and the ligament remain undivided.

If the matter flows in great quantities, reſembles melted glue, and is of an oily conſiſtence, it will require a ſecond inciſion, eſpecially if any cavities are diſcovered by the finger or probe; theſe ſhould be opened by the knife, the orifices made depending, and the wound dreſſed with the common digeſtive of turpentine, honey, and tincture of myrrh, and, after digeſtion, with the precipitate ointment; or waſh with the following made hot, and fill up the cavity with tow ſoaked in it.

Take vinegar or ſpirit of wine half a pint, white vitriol diſſolved in ſpring-water half an ounce, tincture of myrrh four ounces.

This may be made ſharper by adding more vitriol; but if the fleſh is very luxuriant, it ſhould firſt be pared down with a knife before the application. With this waſh alone Mr Gibſon has cured this diſorder without any other formality of dreſſing, waſhing with it twice a-day, and laying over the part a quantity of tow ſoaked in vinegar and the white of eggs beat together.

But the moſt compendious method of cure, is found by obſervation to be by *ſcalding*, as the farriers term it; and is thus proſecuted when the ſore is foul, of a bad diſpoſition, and attended with a profuſion of matter.

Take corroſive ſublimate, verdigreaſe in fine powder, and Roman vitriol, of each two drams; green copperas half an ounce, honey or Ægyptiacum two ounces, oil of turpentine and train-oil of each eight ounces, rectified ſpirit of wine four ounces; mix together in a bottle.

The manner of ſcalding is firſt to clean the abſceſs well with a piece of ſponge dipped in vinegar; then put a ſufficient quantity of the mixture into a ladle with a ſpout; and when it is made ſcalding hot, pour it into the abſceſs, and cloſe the lips together with one or more ſtitches. This is to remain in ſeveral days; and if good matter appears, and not in an over great quantity, it will do well without any other dreſſing, but bathing with ſpirit of wine; if the matter flows in great abundance, and of a thin conſiſtence, it muſt be ſcalded again, and repeated till the matter leſſens and thickens.

SECT. XXXI. *Of a Fiſtula, and Bruiſes on the Withers, Warbles on the Back, and Sit-faſts.*

1. Bruiſes on the withers frequently impoſthumate, and for want of care turn fiſtulous. They ariſe often from pinches of the ſaddle, and ſhould be treated with repellers: for this purpoſe bathe the tumour well with hot vinegar three or four times a-day; if that does not ſucceed alone, an ounce of oil of vitriol may be put to a quart of vinegar, or half an ounce of white vitriol diſſolved in a little water, and added to the ſame quantity. Theſe are generally very effectual repellers for this purpoſe in horſes, and will frequently prevent impoſthumation: when the ſwelling is attended with heat, ſmarting, and little hot watery pimples, the following mixture will then be more proper to bathe with.

Take two ounces of crude ſal ammoniac, boiled in a quart of lime-water; where that cannot be had, a handful of pearl or wood aſhes may be boiled in common water; pour off the decoction when ſettled, and mix with it half a pint of ſpirit of wine: anoint the part afterwards with linſeed oil, or elder ointment, to ſoften and ſmooth the ſkin.

But when the ſwellings are critical, the conſequence of a fever ſettled on this part, you muſt avoid the repelling method, and aſſiſt in bringing the ſwelling to matter, by means of ſuppurating poultices: experienced farriers adviſe, never to open theſe tumours till they break of themſelves: for if they are opened before they are ripe, the whole ſore will be ſpongy, and diſcharge a bloody ichor, which ſoon degenerates into a ſordid ulcer.

Of a Curb, &c.

or three weeks is often enough; and it may in this manner be continued ſix or ſeven times, without the leaſt blemiſh, and will generally be attended with ſucceſs.

But the ſpavins that put out on older or full-aged horſes are apt to be more obſtinate, as being ſeated more inward; and when they run among the ſinuoſities of the joint, they are for the moſt part incurable, as they then lie out of the reach of applications, and are arrived to a degree of impenetrable hardneſs.

The uſual method in theſe caſes is to fire directly, or to uſe the ſtrongeſt kind of cauſtic bliſters; and ſometimes to fire and lay the bliſter immediately over the part: but this way ſeldom ſucceeds farther than putting a ſtop to the growth of the ſpavin, and is apt to leave both a blemiſh and ſtiffneſs behind; beſides the great riſk run (by applications of theſe fiery and cauſtic medicines to the nervous and tendinous parts about the joints) of exciting violent pain and anguiſh, and deſtroying the limb.

The beſt and ſafeſt way, therefore, is to make trial of the bliſtering ointment above, and to continue it according to the directions there laid down, for ſome months, if found neceſſary; the horſes in the intervals working moderately: the hardneſs will thus be diſſolved by degrees, and wear away inſenſibly.

Where the ſpavin lies deep, and runs ſo far into the hollow of the joint that no application can reach it, neither firing nor medicines can avail, for the reaſons above-mentioned; though bold ignorant fellows have ſometimes ſucceeded in caſes of this ſort (by men of judgment deemed incurable) by the application of cauſtic ointments with ſublimate, which act very forcibly, enter deep, and make a large diſcharge, and by that means deſtroy a great part of the ſubſtance, and diſſolve away the remainder: though, whoever is at all acquainted with the nature of theſe medicines, muſt know how dangerous in general their operation is on theſe occaſions; and that a proper prepared cautery made like a fleam, under the direction of a ſkilful hand, may be applied with leſs danger of injuring either tendons or ligaments. After the ſubſtance of the ſwelling has been properly penetrated by the inſtrument, it muſt be kept running by the precipitate medicine, or mild bliſtering ointment. Where the ſpavin lies not deep in the joint, and the bliſtering method will not ſucceed, the ſwelling may be ſafely fired with a thin iron forced pretty deep into the ſubſtance, and then ſhould be dreſſed as is above directed.

SECT. XXVIII. *Of a Curb and Ring-bone.*

1. As a ſpavin riſes among the bones on the fore-part of the hock, ſo a curb takes its origin from the junctures of the ſame bones, and riſes on the hind-part, forming a pretty large tumour over the back part of the hind-leg, attended with ſtiffneſs, and ſometimes with pain and lameneſs.

A curb proceeds from the ſame cauſes that produce ſpavins; viz. hard riding, ſtrains, blows, or kicks. The cure at firſt is generally eaſy enough effected by bliſtering, repeated two or three times, or oftener. If it does not ſubmit to this treatment, but grows exceſſively hard, the quickeſt and ſureſt way is to fire with a thin iron, making a line down the middle from top to bottom, and drawing ſeveral lines in a penniform manner pretty deep; and then to apply a mild bliſtering plaſter or ointment over it.—This method will entirely remove it.

There is another ſwelling taken notice of on the outſide of the hock, which is called a *jardon*. This commonly proceeds from blows and kicks of other horſes; but frequently happens to menaged horſes, by ſetting them on their haunches: it is ſeldom attended with much lameneſs, unleſs it has been neglected, or ſome little proceſs of the bone be broke. It ſhould firſt be treated with the coolers and repellers in ſect. xxxi.: but if any ſwelling continues hard, and inſenſible, the beſt way is to bliſter or fire; but the mild bliſters alone generally ſucceed.

2. The *ring-bone* is a hard ſwelling on the lower part of the paſtern, which generally reaches half-way round the fore-part thereof, and from its reſemblance to a ring has its denomination. It often ariſes from ſtrains, &c.; and, when behind, from putting young horſes too early upon their haunches; for in that attitude a horſe throws his whole weight as much, if not more, upon his paſterns, than on his hocks.

When it appears diſtinctly round the paſtern, and does not run downwards toward the coronet, ſo as to affect the coffin-joint, it is eaſily cured: but if it takes its origin from ſome ſtrain or defect in the joint originally, or if a calloſity is found under the round ligament that covers that joint, the cure is generally dubious, and ſometimes impracticable; as it is apt to turn to a quittor, and in the end to form an ulcer upon the hoof.

The ring-bones that appear on colts and young horſes, will often inſenſibly wear off of themſelves, without the help of any application; but when the ſubſtance remains, there needs no other remedy beſides bliſtering, unleſs when by long continuance it is grown to an obſtinate hardneſs, and then it may require both bliſtering and firing.

To fire a ring-bone ſucceſsfully, let the operation be performed with a thinner inſtrument than the common one, and let the lines or razes be made not above a quarter of an inch diſtant, croſſing them obliquely, ſomewhat like a chain: apply a mild bliſter over all, and, when quite dried up, the rupture-plaſter; and then turn the horſe to graſs for ſome time.

SECT. XXIX. *Of Splents.*

Of Splents.

THESE are hard excreſcences that grow on the ſhank-bone, and are of various ſhapes and ſizes. Some horſes are more ſubject to ſplents than others; but young horſes are moſt liable to theſe infirmities, which often wear off and diſappear of themſelves. Few horſes put out ſplents after they are ſeven or eight years old, unleſs they meet with blows or accidents.

A ſplent that ariſes in the middle of the ſhank-bone is nowiſe dangerous; but thoſe that ariſe on the back part of this bone, when they grow large and preſs againſt the back ſinew, always cauſe lameneſs or ſtiffneſs, by rubbing againſt it: the others, except they are ſituated near the joints, ſeldom occaſion lameneſs.

As to the cure of ſplents, the beſt way is not to meddle with them, unleſs they are ſo large as to diſfigure a horſe, or are ſo ſituated as to endanger his going lame.

Splents in their infancy, and on their firſt appearance, Of the Poll-evil.

ance, ſhould be well bathed with vinegar, or old verjuice; which, by ſtrengthening the fibres, often put a ſtop to their growth: for the membrane covering the bone, and not the bone itſelf, is here thickened; and in ſome conſtitutions purging, and afterwards diuretic drinks, will be a great means to remove the humidity and moiſture about the limbs, which is what often gives riſe to ſuch excreſcences.

Various are the remedies preſcribed for this diſorder; the uſual way is to rub the ſplent with a round ſtick or the handle of a hammer, till it is almoſt raw, and then touch it with oil of origanum. Others lay on a pitch-plaſter, with a little ſublimate, or arſenic, to deſtroy the ſubſtance; ſome uſe oil of vitriol; ſome tincture of cantharides: all which methods have at times ſucceeded; only they are apt to leave a ſcar, with the loſs of hair. Thoſe applications that are of a more cauſtic nature often do more hurt than good, eſpecially when the ſplent is grown very hard, as they produce a rottenneſs, which keeps running ſeveral months before the ulcer can be healed, and then leaves an ugly ſcar.

Mild bliſters often repeated, as recommended in the ſection upon the *Bone Spavin*, ſhould firſt be tried as the moſt eligible method; and will generally ſucceed, even beyond expectation: but if they fail, and the ſplent be near the knee or joints, you muſt fire and bliſter in the ſame manner as for the bone-ſpavin.

Splents on the back part of the ſhank-bone are difficult to cure, by reaſon of the back ſinews covering them: the beſt way is to bore the ſplent in ſeveral places with an iron not very hot; and then to fire in the common way, not making the lines too deep, but very cloſe together.

SECT. XXX. *Of the Poll-evil.*

THE poll-evil is an abſceſs near the poll of a horſe, formed in the ſinuſes between the poll-bone and the uppermoſt vertebræ of the neck.

If it proceeds from blows, bruiſes, or any external violence, at firſt bathe the ſwelling often with hot vinegar; and if the hair be fretted off with an ouzing thro' the ſkin, make uſe of two parts of vinegar, and one of ſpirit of wine; but if there be an itching, with heat and inflammation the ſafeſt way is to bleed, and apply poultices with bread, milk, and elder flowers: this method, with the aſſiſtance of phyſic, will frequently diſperſe the ſwelling and prevent this evil.

But when the tumour is critical, and has all the ſigns of matter, the beſt method then is to forward it by applying the ripening poultices already taken notice of, till it comes to maturity, and burſts of itſelf; or if opened with a knife, great care ſhould be taken to avoid the tendinous ligament that runs along the neck under the mane; when matter is on both ſides, the opening muſt be made on each ſide, and the ligament remain undivided.

If the matter flows in great quantities, reſembles melted glue, and is of an oily conſiſtence, it will require a ſecond inciſion, eſpecially if any cavities are diſcovered by the finger or probe; theſe ſhould be opened by the knife, the orifices made depending, and the wound dreſſed with the common digeſtive of turpentine, honey, and tincture of myrrh, and, after digeſtion, with the precipitate ointment; or waſh with the following made hot, and fill up the cavity with tow ſoaked in it.

Of a Fiſtula, &c.

TAKE vinegar or ſpirit of wine half a pint, white vitriol diſſolved in ſpring-water half an ounce, tincture of myrrh four ounces.

This may be made ſharper by adding more vitriol; but if the fleſh is very luxuriant, it ſhould firſt be pared down with a knife before the application. With this waſh alone Mr Gibſon has cured this diſorder without any other formality of dreſſing, waſhing with it twice a-day, and laying over the part a quantity of tow ſoaked in vinegar and the white of eggs beat together.

But the moſt compendious method of cure, is found by obſervation to be by *ſcalding*, as the farriers term it; and is thus proſecuted when the ſore is foul, of a bad diſpoſition, and attended with a profuſion of matter.

TAKE corroſive ſublimate, verdigreaſe in fine powder, and Roman vitriol, of each two drams; green copperas half an ounce, honey or Ægyptiacum two ounces, oil of turpentine and train-oil of each eight ounces, rectified ſpirit of wine four ounces; mix together in a bottle.

The manner of ſcalding is firſt to clean the abſceſs well with a piece of ſponge dipped in vinegar; then put a ſufficient quantity of the mixture into a ladle with a ſpout; and when it is made ſcalding hot, pour it into the abſceſs, and cloſe the lips together with one or more ſtitches. This is to remain in ſeveral days; and if good matter appears, and not in an over great quantity, it will do well without any other dreſſing, but bathing with ſpirit of wine; if the matter flows in great abundance, and of a thin conſiſtence, it muſt be ſcalded again, and repeated till the matter leſſens and thickens.

SECT. XXXI. *Of a Fiſtula, and Bruiſes on the Withers, Warbles on the Back, and Sit-faſts.*

1. BRUISES on the withers frequently impoſthumate, and for want of care turn fiſtulous. They ariſe often from pinches of the ſaddle, and ſhould be treated with repellers: for this purpoſe bathe the tumour well with hot vinegar three or four times a-day; if that does not ſucceed alone, an ounce of oil of vitriol may be put to a quart of vinegar, or half an ounce of white vitriol diſſolved in a little water, and added to the ſame quantity. Theſe are generally very effectual repellers for this purpoſe in horſes, and will frequently prevent impoſthumation: when the ſwelling is attended with heat, ſmarting, and little hot watery pimples, the following mixture will then be more proper to bathe with.

TAKE two ounces of crude ſal ammoniac, boiled in a quart of lime-water; where that cannot be had, a handful of pearl or wood aſhes may be boiled in common water; pour off the decoction when ſettled, and mix with it half a pint of ſpirit of wine: anoint the part afterwards with linſeed oil, or elder ointment, to ſoften and ſmooth the ſkin.

But when the ſwellings are critical, the conſequence of a fever ſettled on this part, you muſt avoid the repelling method, and aſſiſt in bringing the ſwelling to matter, by means of ſuppurating poultices: experienced farriers adviſe, never to open theſe tumours till they break of themſelves: for if they are opened before they are ripe, the whole ſore will be ſpongy, and diſcharge a bloody ichor, which ſoon degenerates into a ſordid ulcer.

Of Wind-galls.

ulcer. But take care to enlarge the openings, and pare away the lips, that your dreſſings may be applied eaſily; and avoid the ligament which runs along the neck to the withers: if a gathering forms on the oppoſite ſide, open it in the ſame manner; but take care they incline downwards, for the ſake of depending orifices, and letting the matter flow off eaſily. For the method of dreſſing, we muſt refer to the preceding Section; and if the bones ſhould be found foul, they muſt be dreſſed with tincture of myrrh till they ſcale off: if the fungus is very troubleſome, and the diſcharge oily, yellow, and viſcid, pledgets ſoaked in the following, made hot, have been found very effectual, bathing the ſwelling round with ſpirit of wine and vinegar.

TAKE half an ounce of blue vitriol diſſolved in a pint of water; oil of turpentine, and rectified ſpirit of wine, of each four ounces: white-wine vinegar, ſix ounces; oil of vitriol and Ægyptiacum, of each two ounces.

When the cavities are truly fiſtulous, the calloſities muſt be cut out, where it can be done, with a knife; and the remainder deſtroyed by corroſives, *viz.* precipitate, burnt alum, and white vitriol, as we have already obſerved in the Section on *Ulcers*.

2. *Warbles* are ſmall hard tumours under the ſaddle-part of the horſe's back, occaſioned by the heat of the ſaddle in travelling, or its uneaſy ſituation. A hot greaſy diſh-clout, at firſt frequently applied, will ſometimes remove them. Camphorated ſpirits of wine are alſo very effectual for this purpoſe to diſperſe them, to which a little ſpirit of ſal armoniac may be added. The repellers above-mentioned are ſucceſsfully applied in theſe caſes; and if you are obliged to work the horſe, take care your ſaddle is nicely chambered.

3. A *ſit-faſt* proceeds generally from a warble, and is the horſe's hide turned horny; which, if it cannot be diſſolved and ſoftened by rubbing with the mercurial ointment, muſt be cut out, and treated then as a freſh wound.

SECT. XXXII. *Of Wind-galls, Blood and Bog Spavins.*

1. A WIND-GALL is a flatulent ſwelling, which yields to the preſſure of the finger, and recovers its ſhape on the removal thereof: the tumour is viſible to the eye, and often ſeated on both ſides of the back ſinew, above the fetlocks, on the fore-legs, but moſt frequently on the hind-legs; though they are met with in various parts of the body, wherever membranes can be ſo ſeparated, that a quantity of air and ſeroſities may be included within their duplicatures.

When they appear near the joints and tendons, they are generally cauſed by ſtrains, or bruiſes on the ſinews, or the ſheath that covers them; which, by being overſtretched, have ſome of their fibres ruptured; whence probably may ouze out that fluid which is commonly found with the included air: though, where theſe ſwellings ſhew themſelves in the interſtices of large muſcles, which appear blown up like bladders, air alone is the chief fluid; and theſe may ſafely be opened, and treated as a common wound.

On the firſt appearance of wind-galls, their cure ſhould be attempted by reſtringents and bandage: for which purpoſe, let the ſwelling be bathed twice a-day with vinegar, or verjuice alone; or let the part be fomented with a decoction of oak-bark, pomegranate, and alum boiled in verjuice, binding over it, with a roller, a woollen cloth ſoaked in the ſame. Some, for this purpoſe, uſe red-wine lees, others curriers ſhavings wetted with the ſame, or vinegar, bracing the part up with a firm bandage.

Of Spavins.

If this method, after a proper trial, ſhould not be found to ſucceed, authors have adviſed the ſwelling to be pierced with an awl, or opened with a knife: but mild bliſtering has in general the preference given to theſe methods; the included fluids being thereby drawn off, the impacted air diſperſed, and the tumour gradually diminiſhed.

2. A *blood-ſpavin* is a ſwelling and dilatation of the vein that runs along the inſide of the hock, forming a little ſoft ſwelling in the hollow part, and is often attended with a weakneſs and lameneſs of the hock.

The cure ſhould be firſt attempted with the reſtringents and bandage above recommended, which will contribute greatly to ſtrengthen all weakneſſes of the joints, and frequently will remove this diſorder if early applied; but if by theſe means the vein is not reduced to its uſual dimenſions, the ſkin ſhould be opened, and the vein tied with a crooked needle and wax-thread paſſed underneath it, both above and below the ſwelling, and the turgid part ſuffered to digeſt away with the ligatures: for this purpoſe, the wound may be daily dreſſed with turpentine, honey, and ſpirit of wine, incorporated together.

3. A *bog-ſpavin* is an encyſted tumour on the inſide of the hough; or, according to Dr Bracken, a collection of browniſh gelatinous matter, contained in a bag, or cyſt, which he thinks to be the lubricating matter of the joint altered, the common membrane that incloſes it forming the cyſt. This caſe he has taken the pains to illuſtrate in a young colt of his own, where he ſays, When the ſpavin was preſſed hard on the inſide the hough, there was a ſmall tumour on the outſide, which convinced him the fluid was within-ſide the joint: he accordingly cut into it; diſcharged a large quantity of this gelatinous matter; dreſſed the ſore with doſſils dipped in oil of turpentine; putting into it, once in three or four days, a powder made of calcined vitriol, alum, and bole: by this method of dreſſing, the bag ſloughed off, and came away, and the cure was ſucceſsfully completed without any viſible ſcar.

This diſorder, according to the above deſcription, will ſcarcely ſubmit to any other method, except firing, when the cyſt ought to be penetrated to make it effectual; but in all obſtinate caſes that have reſiſted the above methods, both the cure of this and of the ſwellings called *wind-galls* ſhould be attempted in this manner. If, through the pain attending the operation or dreſſings, the joint ſhould ſwell and inflame, foment it twice a-day, and apply a poultice over the dreſſings till it is reduced.

SECT. XXXIII. *Of Mallenders and Sallenders.*

MALLENDERS are cracks in the bend of the horſe's knee, that diſcharge a ſharp indigeſted matter; they are often the occaſion of lameneſs, ſtiffneſs, and the horſe's tumbling.

Sallenders are the ſame diſtemper, ſituated on the bending of the hough, and occaſion a lameneſs behind.

They

Of Lampas, &c.

They are both cured by waſhing the parts with a lather of ſoap warmed, or old chamber-lye; and then apply over the cracks a ſtrong mercurial ointment ſpread on tow, with which they ſhould be dreſſed, night and morning, till all the ſcabs fall off: if this ſhould not ſucceed, anoint them night and morning with a little of the following, and apply the above ointment over it.

Take hogs lard, two ounces; ſublimate mercury, two drams.

Or, Take hogs lard, two ounces; oil of vitriol, two drams.

Take the next from Gibſon, which is to be depended on.

Æthiops mineral, half an ounce; white vitriol, one dram; ſoft green ſoap, ſix ounces.

Anoint with this often; but firſt clip away the hair, and clear the ſcabs. On their drying up, it may be proper to give a gentle purge or two; or the nitre-balls may be taken advantageouſly, for a fortnight or three weeks.

Sect. XXXIV. *Of Lampas, Barbs, and Wolves-teeth.*

1. The *lampas* is an excreſcence in the roof of the horſe's mouth, which is ſometimes ſo luxuriant, that it grows above the teeth, and hinders his feeding. The cure is in lightly cauteriſing the fleſh with a hot iron, taking care that it does not penetrate too deep, ſo as to ſcale off the thin bone that lies under the upper bars; the part may be anointed with burnt alum and honey, which is proper for moſt ſores in the mouth.

This operation is by ſome thought to be entirely unneceſſary; it being a general obſervation with them, that all young horſes have their mouths more or leſs full of what are called *lampas*; and that ſometimes they riſe higher than the fore-teeth; but they further obſerve, in proportion as a horſe grows older, the roof flattens of itſelf, and the teeth then appear to riſe. We are obliged to the ingenious M. La Foſſe for this remark, and hope it will be the means of aboliſhing this cruel and unneceſſary operation.

2. *Barbs* are ſmall excreſcences under the tongue, which may be diſcovered by drawing it aſide, and are cured by cutting cloſe off, and waſhing with brandy or ſalt and water.

3. A horſe is ſaid to have *wolves-teeth*, when the teeth grow in ſuch a manner, that their points prick or wound either the tongue or gums in eating. Old horſes are moſt liable to this infirmity, and whoſe upper overſhoot the under teeth in a great degree.

To remedy this evil, you may either chop off the ſuperfluous parts of the teeth with a chiſſel and mallet, or file them down, which is the better way, till you have ſufficiently waſted them.

Sect. XXXV. *Of the Greaſe.*

Of the Greaſe.

In order to treat this diſorder with ſome propriety, we ſhall conſider it as ariſing from two different cauſes; a fault or relaxation in the veſſels, or a bad diſpoſition in the blood and juices. We muſt here obſerve, that the blood and juices (or humours, for there are always ſome in the beſt ſtate of blood) are brought to the extreme parts by the arteries, and returned by the veins; in which latter, the blood is to riſe in perpendicular columns, to return the circulating fluids from the extremities: hence ſwellings in the legs of horſes may eaſily be accounted for, from a partial ſtagnation of the blood and juices in the finer veſſels, where the circulation is moſt languid; and eſpecially when there is want of due exerciſe, and a proper muſcular compreſſion on the veſſels, to puſh forward the returning blood, and propel the inert and half-ſtagnating fluids through their veſſels; in ſhort, the blood in ſuch caſes cannot ſo readily aſcend as deſcend, or a greater quantity is brought by the arteries than can be returned by the veins.

The greaſe then, conſidered in this light, muſt be treated as a local complaint, where the parts affected are alone concerned, the blood and juices being yet untainted, and in good condition; or as a diſorder where they are both complicated: but when it is an attendant on ſome other diſtemper, as the farcy, yellows, dropſy, *&c.* ſuch diſeaſes muſt firſt be cured before the greaſe can be removed. In the former caſe, moderate exerciſe, proper dreſſing, cleanlineſs, and external application, will anſwer the purpoſe; in the latter, internals muſt be called in to our aſſiſtance, with proper evacuations.

When a horſe's heels are firſt obſerved to ſwell in the ſtable, and ſubſide or go down on exerciſe; let care be taken to waſh them very clean every time he comes in, with ſoap-ſuds, chamber-ley, or vinegar and water; which, with proper rubbing, will frequently prevent, or remove, this complaint: or let them be well bathed twice a-day with old verjuice, or the following mixture, which will brace up the relaxed veſſels; and if rags dipped in the ſame are rolled on, with a proper bandage, for a few days, it is moſt likely the ſwellings will ſoon be removed by this method only, as the bandage will ſupport the veſſels till they have recovered their tone. To anſwer this end, alſo, a laced ſtocking made of ſtrong canvas or coarſe cloth, neatly fitted to the part, would be found extremely ſerviceable, and might eaſily be contrived by an ingenious mechanic.

Take rectified ſpirit of wine, four ounces; diſſolve in it half an ounce of camphor; to which add wine-vinegar, or old verjuice, ſix ounces; white vitriol, diſſolved in a gill of water, one ounce; mix together, and ſhake the phial when uſed.

But if cracks or ſcratches are obſerved, which ooze and run, let the hair be clipped away, as well to prevent a lodgment (which becomes ſtinking and offenſive by its ſtay), as to give room for waſhing out dirt or gravel, which, if ſuffered to remain there, would greatly aggravate the diſorder.

When this is the caſe, or the heels are full of hard ſcabs, it is neceſſary to begin the cure with poultices, made either of boiled turnips and lard, with a handful of linſeed powdered; or oatmeal and rye-flour, with a little common turpentine and hogs lard, boiled up with ſtrong-beer grounds or red-wine lees. The digeſtive ointment being applied to the ſores for two or three days, with either of theſe poultices over it, will, by ſoftening them, promote a diſcharge, unload the veſſels, and take down the ſwelling; when they may be dried up with the following:

Take white vitriol and burnt alum, of each two ounces; Ægyptiacum, one ounce; lime-water, a

Of the Greaſe.

quart or three pints: waſh the ſores with a ſponge dipped in this, three times a-day; and apply the common white ointment ſpread on tow, to an ounce of which may be added two drams of ſugar of lead.

This method is generally very ſucceſsful, when the diſtemper is only local, and requires no internal medicines; but if the horſe be full and groſs, his legs greatly gorged, ſo that the hair ſtares up, and is what ſome term pen-feathered, and has a large ſtinking diſcharge from deep foul ſores, you may expect to meet with great trouble, as theſe diſorders are very obſtinate to remove, being often occaſioned by a poor dropſical ſtate of blood, or a general bad diſpoſition in the blood and juices.

The cure in this caſe, if the horſe is full and fleſhy, muſt be begun by bleeding, rowels, and repeated purging; after which, diuretic medicines are frequently given with ſucceſs. Thus,

Take four ounces of yellow roſin, one of ſal prunellæ; grind them together with an oiled peſtle; add a dram of oil of amber; and give a quart of forge-water every morning, faſting two hours before and after taking, and ride moderately.

As this drink is found very diſagreeable to ſome horſes, we would recommend the nitre-balls in its ſtead, given to the quantity of two ounces a-day, for a month or ſix weeks, mixed up with honey, or in his feeds: take the following alſo for that purpoſe.

Yellow roſin, four ounces; ſalt of tartar, and ſal prunellæ, of each two ounces; Venice ſoap, half a pound; oil of juniper, half an ounce; make into balls of two ounce weight, and give one every morning.

The legs, in this caſe, ſhould be bathed or fomented, in order to breathe out the ſtagnant juices, or to thin them, ſo that they may be able to circulate freely in the common current. For this purpoſe, foment twice a-day with the diſcutient fomentation, (p. 26. col. 1.) in which a handful or two of wood-aſhes has been boiled; apply then the above poultices, or the following, till the ſwelling has ſubſided, when the ſores may be dreſſed with the green ointment till they are properly digeſted, and then dried up with the water and ointment above recommended.

Take honey, one pound; turpentine, ſix ounces; incorporate with a ſpoon; and add of the meal of fenugreek and linſeed, each four ounces; boil in three quarts of red-wine lees to the conſiſtence of a poultice; to which add, when taken from the fire, two ounces of camphor in powder; ſpread it on thick cloths, and apply warm to the legs, ſecuring it on with a ſtrong roller.

If the ſores are very foul, dreſs them with two parts of the wound-ointment, and one of Ægyptiacum; and apply the following, ſpread on thick cloths, and rolled on.

Take of black ſoap, one pound; honey, half a pound; burnt alum, four ounces; verdigreaſe powdered, two ounces; wheat-flour, a ſufficient quantity.

If the diuretic balls ſhould not ſucceed, they muſt be changed for the antimonial and mercurial alteratives, already mentioned: but turning a horſe out in a field, where he has a hovel or ſhed to run to at pleaſure, would greatly contribute to quicken the cure, and indeed would in general effect it alone; but if this cannot be complied with, let him be turned out in the day-time.

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If the horſe is not turned out, a large and convenient ſtall is abſolutely neceſſary, with good dreſſing and care.

The laſt thing we ſhall recommend, is a method to oblige a horſe to lie down in the ſtable. This undoubtedly is of the utmoſt conſequence, as it will not a little contribute to the removal and cure of this diſorder; for by only changing the poſition of his legs, a freer circulation would be obtained, and the ſwelling taken down: whereas in general it is greatly aggravated by the obſtinacy of the horſe, who refuſes to lie down at all (probably from the pain it gives him to bend his legs for that purpoſe), by which means the ſtiffneſs and ſwelling increaſes, till the over-gorged and diſtended veſſels are obliged to give way, and, by burſting, diſcharge the fluids, which ſhould circulate thro' them.

Sect. XXXVI. *Of Scratches, Crown-ſcabs, Rat-tails, and Capellets.*

1. Scratches in the heels have ſo much affinity with the greaſe, and are ſo often concomitants of that diſtemper, that the method of treating them may be ſelected chiefly from the preceding ſection; which at firſt ſhould be by the linſeed and turnip poultice, with a little common turpentine, to ſoften them and relax the veſſels; the green ointment may then be applied for a few days to promote a diſcharge, when they may be dried up with the ointments and waſhes recommended in the above ſection. It is beſt afterwards to keep the heels ſupple, and ſoftened with currier's dubbing, which is made of oil and tallow. This will keep the hide from cracking, and be as good a preſervative as it is to leather; and, by uſing it often before exerciſe, will prevent the ſcratches, if care is taken to waſh the heels with warm water when the horſe comes in. When they prove obſtinate, and the ſores are deep, uſe the following: but if any cavities or hollow places are formed, they ſhould firſt be laid open; for no foundation can be laid for healing, till you can dreſs to the bottom.

Take Venice turpentine, four ounces; quickſilver, one ounce; incorporate well together by rubbing ſome time; and then add honey and ſheeps ſuet, of each two ounces.

Anoint with this once or twice a-day; and if the horſe is full or fleſhy, you muſt bleed and purge; and if the blood is in a bad ſtate, the alteratives muſt be given to rectify it.

2. The *crown-ſcab* is an humour that breaks out round the coronet, which is very ſharp and itching, and attended with a ſcurfineſs: ſharp waters prepared with vitriol are generally uſed for the cure; but the ſafeſt way is firſt to mix marſhmallow and yellow baſilicon, or the wound-ointment, equal parts, and to ſpread them on tow, and lay all round the coronet. A doze or two of phyſic may be very proper, with the diuretic medicines preſcribed in the preced. col. and the alteratives above recommended, in rebellious caſes. *Vid.* the Section on *Alteratives*.

3. *Rat-tails* are excreſcences which creep from the paſtern to the middle of the ſhanks, and are ſo called from

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from the reſemblance they bear to the tail of a rat. Some are moiſt, others dry ; the former may be treated with the drying ointment and waſhes, p. 33. col. 2. par. *ult.* the latter with the mercurial ointment preſcribed in the Section of *Strangles*, laſt paragr. If the hardneſs does not ſubmit to the laſt medicine, it ſhould be pared off with a knife, and dreſſed with turpentine, tar, and honey, to which verdigreaſe or white vitriol may occaſionally be added ; but before the uſe of the knife, you may apply this ointment.

Take black ſoap, four ounces ; quick-lime, two ounces ; vinegar enough to make an ointment.

4. There are particular ſwellings which horſes are ſubject to, of a wenny nature, which grow on the heel of the hock, and on the point of the elbow, and are called by the French and Italians *capellets :* they ariſe often from bruiſes and other accidents ; and when this is the caſe, ſhould be treated with vinegar and other repellers. But when they grow gradually on both heels or elbows, we may then ſuſpect the blood and juices in fault, and that ſome of the veſſels are broke and juices extravaſated: in this caſe, the ſuppuration ſhould be promoted, by rubbing the part with marſhmallow ointment ; and when matter is formed, the ſkin ſhould be opened with a lancet, in ſome dependent part towards one ſide, to avoid a ſcar: the dreſſings may be turpentine, honey, and tincture of myrrh. The relaxed ſkin may be bathed with equal parts of ſpirit of wine and vinegar, to which an eighth part of oil of vitriol may be added. The contents of theſe tumours are various ; ſometimes watery ; at others ſuety, or like thick paſte ; which, if care be not taken to digeſt out properly with the cyſt, will frequently collect again ; was it not for the diſfigurement, the ſhorteſt method would be to extirpate them with a knife, which, if artfully executed, and the ſkin properly preſerved, would leave very little deformity.

Sect. [XXXVII.] XXXVIII. *Of Ruptures, Anticor, Colt-evil or Gonorrhœa, and Diſeaſes of the Mouth.*

1. In regard to *ruptures*, though they are generally divided into particular claſſes, we ſhall only obſerve, that by violent efforts of the horſe, or other accidents, the guts or caul may be forced between the muſcles of the belly at the navel, and through the rings of the muſcles into the ſcrotum or cod. The ſwellings are generally about the ſize of a man's fiſt, ſometimes much larger, deſcending to the very hock: they are frequently ſoft, and yield to the preſſure of the hand, when they will return into the cavity of the belly with a rumbling noiſe ; and, in moſt, the vacuity may be felt through which they paſſed.

On their firſt appearance, endeavours ſhould be made to return them by the hand ; but if the ſwelling ſhould be hard and painful, in order to relieve the ſtricture, and relax the parts through which the gut or caul has paſſed, let a large quantity of blood be immediately taken away, and the part fomented twice or thrice a-day, applying over it a poultice made of oatmeal, oil, and vinegar, which ſhould be continued till the ſwelling grows ſoft and eaſier, or the gut is returned. In the mean time, it would be proper to throw up emollient oily glyſters twice a-day, and to let the horſe's chief diet be boiled barley, ſcalded malt, or bran.

Colt-evil, &c.

Should the ſwelling afterwards return, we apprehend the reſtringent applications, uſually recommended on theſe occaſions, will avail little without a ſuſpenſory bandage; ſo that an ingenious mechanic in that art is chiefly to be relied on for any future aſſiſtance; though it has been obſerved, that with moderate feeding, and gentle exerciſe, ſome horſes have continued to be very uſeful under this complaint.

2. The *anticor* is a diſorder not very common among our horſes, or thoſe in northern climates; but is particularly taken notice of by the French, Spaniſh, and Italian writers; who deſcribe it a malignant ſwelling in the breaſt, which extends ſometimes to the very ſheath under the belly ; it is attended with a fever, great depreſſions and weakneſs, and a total loſs of appetite.

The cure ſhould be firſt attempted by large and repeated bleedings, to abate the inflammation ; emollient glyſters ſhould be injected twice or thrice a-day, with an ounce of ſal prunella in each, and the cooling drink in the Section on Fevers ſhould be given inwardly ; the ſwelling ſhould be bathed with the marſhmallow ointment; and a ripening poultice, with onions boiled in it, ſhould be applied over it. If by this method, continued four or five days, the inflammation in the throat and gullet is removed, our attention ſhould more particularly turn to encourage the ſwelling at the breaſt, and bring it, if poſſible, to matter : to which end, continue the poultice, and give two ounces of Venice treacle diſſolved in a pint of beer every night ; when the ſwelling is grown ſoft, it muſt be opened with the knife, and dreſſed with turpentine digeſtive, the danger now being over.

But ſhould it be found impracticable to bring the ſwelling to matter, and it increaſes upwards, ſo as to endanger ſuffocation ; authors have adviſed to pierce the tumour with a hot pointed cautery in five or ſix places; to dreſs with the above digeſtive ; and, in order to ſtimulate and promote a greater diſcharge, to add to it a ſmall quantity of Spaniſh flies and euphorbium in powder ; fomenting at the ſame time, and bathing the circumjacent parts with ointment of marſhmallows. M. Gueriniere, as well as Solyſell, have adviſed opening the ſkin, when the tumour cannot be brought to matter, in order to introduce a piece of black hellebore-root ſteeped in vinegar, and to confine it there for 24 hours : this alſo is intended as a ſtimulant ; and is ſaid to anſwer the intention, by occaſioning ſometimes a ſwelling as big as a man's head.

3. Beſides the diſorders of the mouth, which we have already animadverted on, there are frequently obſerved on the inſide the lips and palate, little ſwellings or bladders called *giggs*. Slitting them open with a knife or lancet, and waſhing them afterwards with ſalt and vinegar, is in general their cure ; but when they degenerate into what are called *cankers*, which are known by little white ſpecks, that ſpread and occaſion irregular ulcers, the beſt method then is to touch them daily with a ſmall flat cautery, moderately heated till the ſpreading is ſtopped, and to rub the ſores three or four times a day with Ægyptiacum, and tincture of myrrh ſharpened with oil or ſpirit of vitriol; when by this dreſſing the ſloughs are ſeparated, they may be waſhed frequently with a ſponge dipped in copperas, or ſublimate water, if they continue to ſpread; or a tincture made by diſſolving half an ounce of burnt alum,

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and two ounces of honey, in a pint of tincture of roſes. Either of theſe will dry them up, and are very uſeful in moſt diſorders of the mouth.

A relaxation and ſwelling of the palate ſometimes happens to horſes on catching cold. To remedy this diſorder, blow pepper on the part, or anoint it with the ſame mixed up with honey. The tincture above mentioned may be uſed for this purpoſe, to which may be added half an ounce of ſpirit of ſal armoniac.

4. The colt-evil is ſuppoſed to ariſe from ſtoned colts having full liberty with mares, before they are able to cover them; whence frequently enſues an excoriation or fretting on the glands and a ſwelling on the ſheath. This laſt diſorder frequently proceeds too from dirt or filth lodging there, and is often removed by waſhing the part clean with butter and beer: but when the yard itſelf is ſwelled, foment it twice a-day with marſhmallows boiled in milk, to which may be added a little ſpirit of wine; anoint the excoriation with the white ointment, or waſh it with a ſponge dipped in lime, to a pint of which may be added two drams of ſugar of lead: the yard ſhould be ſuſpended up to the belly; and if the ſwelling ſhould increaſe with the inflammation, bleed, and give the cooling phyſic, anoint with ointment of alder, and apply the bread-and-milk poultice.

If a ſimple gonorrhœa or ſeminal gleet is obſerved to drip from the yard, (which is often the caſe in high-fed young horſes, where a relaxation of the glands and ſeminal veſſels has been brought on by frequent emiſſions), let the horſe be plunged every day into a river or pond; give him two or three rhubarb purges, at proper diſtances; and intermediately the following balls.

> Take of balſam of copivi, or Venice turpentine, olibanum, and maſtich powdered, of each two drams; bole armeniac, half an ounce: mix up into a ball with honey, and give it night and morning till the diſcharge leſſens, and then every night till it goes off.

Balls prepared with rhubarb and turpentine may alſo be given for this purpoſe; two drams of the former, with half an ounce of the latter.

DISEASES OF THE FEET.

Sect. XXXIX. *Preliminary Remarks.*

I. *Of Greaſing, Oiling, and Stuffing Horſes Hoofs.* The cuſtom of keeping our fineſt horſes conſtantly ſtanding upon dry litter and hot dung in the ſtable, is exceedingly hurtful to the feet and legs, particularly the former, which are always found to agree beſt with coolneſs and moiſture. Hence we find, that horſes hoofs, whilſt running in the fields, are always in better condition than thoſe that are kept hot and dry in the ſtable, which, beſide being liable to many diſeaſes, are hard, brittle, ſhattered, and often broken.

With reſpect to greaſy or oily applications, ſo often preſcribed for the hoofs of horſes in order to preſerve them ſound, tough, *&c.* Mr Clark * very juſtly condemns them as rather pernicious than ſalutary.

When young horſes (he obſerves) are firſt taken from the fields, their hoofs are cool, ſound, and tough. Theſe are found from experience to be good qualities. But horſes are no ſooner introduced into the ſtable, than their hoofs are greaſed or oiled two or three times a-week: and if they are kept much in the houſe ſtanding upon hot dry litter, without being frequently led abroad, and without having an opportunity of getting their hoofs cooled and moiſtened in wet ground, their hoofs grow ſo brittle, dry, and hard, that pieces frequently break off, like chips from a hard ſtone; and, when driving the nails in ſhoeing, pieces will ſplit off, even although the nails are made very fine and thin. Now, if theſe ſame horſes with brittle ſhattered hoofs are turned out out to graze in the fields, their hoofs in time will be come, as they were originally, ſound, tough, and good.

This change muſt undoubtedly be aſcribed to the wet and moiſture which the hoofs are expoſed to in the fields, of which water is the principal ingredient; and it is a certain fact, of which we have daily proofs, that when all other means fail, horſes are turned out to graſs in order to recover their decayed brittle hoofs. It is known, that the hoofs of horſes are porous; and that inſenſible perſpiration is carried on through theſe pores, in the ſame manner, and according to the ſame laws, as take place in other parts of the body. Now, every body knows, that greaſy or oily medicines applied to the ſkin of the human body, prevent perſpiration, which is frequently attended with the worſt conſequences. The ſame reaſoning will hold with reſpect to the hoofs of horſes; for greaſy or oily applications cloſe or ſhut up the pores of the hoof, by being abſorbed or ſucked into its inner ſubſtance. Hence the natural moiſture which ſhould nouriſh the hoof, is thereby prevented from arriving at its ſurface; which, on that account, becomes as it were dead, and conſequently dry, brittle, and hard.

The original practice of greaſing or oiling horſes hoofs, had probably taken its riſe, from obſerving, that greaſe or oil ſoftened dead ſubſtances, ſuch as leather, &c. But this will by no means apply to the hoofs of horſes, as there is a very great difference between the living and dead parts of animals. The former having juices, &c. neceſſary for their own nouriſhmen and ſupport, whilſt the latter require ſuch applications as will preſerve them from decaying and rotting.

The dealers in horſes about London, when they get a bad-footed horſe in their hands, moiſten his hoofs frequently in water; for which purpoſe, they keep a puddle of water and dung at the watering place, that when the horſe comes to water, his fore-feet are ſunk in the puddle, by which means they are cooled and moiſtened twice or thrice every day; ſo that, whilſt they are making up his carcaſe for the market, his hoofs are likewiſe repaired, and ſufficient to ſtand the teſt of a trial upon ſale. But no ſooner do horſes with hoofs of this kind come into other hands, their hoofs at the ſame time being kept dry and greaſed, &c. than they degenerate into their former ſtate. Hence the cauſe of ſo many complaints that horſes turn ſoon lame after they come from dealers, when, in fact, it proceeds from greaſy applications, and neglecting to cool or moiſten the hoofs in water; for the careful groom, when airing his maſter's horſes, rather than lead them into a puddle, will go about in order to keep their legs clean and dry.

Another practice equally pernicious, is the ſtuffing up horſes hoofs (as it is called), with hot, reſinous, and greaſy mixtures, under the notion of cooling and ſoftening them. Various are the preſcriptions recommended for this purpoſe, many of which are of a quite

oppoſite

Obſervations on Horſes Feet.

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* *Obſervations on the ſhoeing of Horſes, and on the diſeaſes of their feet;* from which judicious performance the following ſections are extracted.

Defects of the Feet.

oppoſite nature to the purpoſe intended.——There is likewiſe a great impropriety in ſtuffing up the hoofs with rotten dung and ſtale urine: this, it is true, is moiſture; but of the very worſt kind, on account of the ſalts contained in the urine, which of itſelf greatly contributes towards hardening and drying their hoofs, in place of ſoftening them; beſides the other bad effects which may ariſe to the frog, *&c.* from the rottenneſs of the dung. But, without commenting upon the various compoſitions or pompous preſcriptions recommended in books, or thoſe handed about as receipts for the ſoftening and ſtuffing horſes hoofs, the author would recommend one which is more natural, and ought not to be deſpiſed for its ſimplicity, as it is only cooling and moiſtening the hoofs with water morning and evening: And, to thoſe who are fond of ſtuffing, he would preſcribe bran and water, or clay, *&c.* made into the conſiſtency of a poultice; and, in particular caſes, where horſes ſtand much in the ſtable, and the hoofs are diſpoſed to be very hard, dry, and brittle, a poultice of this kind, or any other emollient compoſition in which water is a principal ingredient, may be applied all round the hoof; or, in imitation of ſome dealers, to keep a puddle of water at the watering place, which will anſwer equally well, if not better. From this manner of treatment, the hoofs will be preſerved in their natural ſtate, and a free and equal perſpiration kept up, by which the nouriſhment natural to the hoof will have free acceſs to its ſurface, as it is this only which cauſes that coheſion of the parts which conſtitutes a firm, ſound, tough hoof.

II. *Of the natural Defects of the Feet.* It is very well known, that different climates and different ſoils greatly affect the feet of horſes. Thoſe that are bred in hot countries, ſtanding moſtly upon dry ground, have deep cruſted hollow hoofs with ſmall frogs; for, being but little expoſed to wet or moiſture, the fibres of the hoof contract more cloſely. And, even in Great Britain, there is a conſiderable difference, according to the dryneſs or wetneſs of the ſoil upon which horſes are bred. Thoſe that are bred upon the mountainous parts of England and Wales, and in the northern parts of of Scotland, have generally good ſound tough hoofs; whilſt thoſe horſes that are bred upon low marſhy grounds, (which are moſtly of the big draught kind), have flat, large, ſoft hoofs; for being kept too moiſt, by always ſoaking in wet, the horny fibres of the hoof are too much relaxed.

Thoſe hoofs which are either too large or too ſmall, in proportion to the ſize of the body, and thickneſs of the bones of the legs, are generally, and not without foundation, looked upon as bad. Large broad hoofs, for the moſt part, have thin flat ſoles; large, ſoft, ſpongy frogs; a ſtrong cruſt, ſomething hollow upon the upper and fore part, and full of wrinkles or rings, not unlike the rough outſide of an oyſter-ſhell. Hoofs of this ſhape are liable to that diſeaſe termed *foundered;* and to have high, round, or ſwelled ſoles, and low weak heels, *&c.*

Small hoofs are liable to the oppoſite extreme, eſpecially thoſe of that kind which generally go under the denomination of *aſſes hoofs*, as they are deep cruſted and narrow, the ſole very hollow, the frog ſmall, the heels high and ſtrong, the cruſt upon the outſide clear and ſhining: theſe are naturally diſpoſed to a contraction of the whole hoof, which is called *hoof-bound;* and likewiſe to corns, running thruſhes, or fruſhes; either of which render a horſe lame.

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Some hoofs are pretty well proportioned, and look well to the eye; but, at the ſame time, they are thin and weak cruſted, and not able to ſtand much fatigue in travelling upon hard ſtoney grounds. On the other hand, very ſtrong cruſted hoofs are by no means the beſt, but are liable to cracks, *&c.* In ſuch hoofs, the horny fibres appear very diſtinct, and run in a ſtraight line from the coronet or top of the hoof to its baſis, reſembling the grain of ſome kinds of wood, particularly oak. Hence they are diſpoſed to cracks or fiſſures, which cleave the hoof quite through, ſometimes from the coronet down to the bottom of the hoof. In others, theſe cracks at firſt do not penetrate through the horn, but appear like a ſeam on the ſurface of the hoof, commonly named a *ſand-crack;* which, from retaining the ſand and gravel, at laſt works its way into the quick, and occaſions lameneſs, *&c.* Another diſadvantage attending very ſtrong cruſted hoofs is, that, when they ſtand long in a dry hot ſtable, they contract, and by their thickneſs and hardneſs bruiſe the internal parts of the foot. Hence the horſe will be lame, though, at the ſame time, no viſible defect will be ſeen about the hoof, excepting a great heat, pain, and tenderneſs in his feet; the true cauſe of which is ſeldom attended to or known; and hence the horſe is ſaid to be lame in ſome other part, perhaps the ſhoulders. Low thin heels are weak-cruſted, and liable to lameneſs from injudicious ſhoeing. The oppoſite extreme, *viz.* very high heels, is equally bad; as theſe are ſubject to corns, and contraction of the hoof; and the deepneſs of the cruſt cauſes a numbneſs in the feet, and unſteadineſs in the horſe's going, which make him liable to trip and ſtumble.

Much has been ſaid by authors, with reſpect to the different colours of horſes hoofs, aſcribing different qualities and temperaments to peculiar colours, ſuch as hardneſs, dryneſs, brittleneſs, *&c.* But it is very well known to practitioners in ſhoeing horſes, that there are good and bad hoofs of all colours; ſome being naturally weak and diſpoſed to be brittle, whilſt others are tough and ſtrong. But a great deal depends upon the management of them in the ſtable, in keeping them properly moiſtened, in order to preſerve a due medium between theſe oppoſite extremes. It is likewiſe generally remarked, by authors, as a ſure ſign of bad thin hoofs, that, when the ſhoe-nails are drove high up in the cruſt, it is, ſay they, an evidence that the cruſt is thin, and that there was not ſufficient hold, without driving the nails high up. But this can be no true criterion to judge by; for, if the nails can be driven high up in the cruſt with ſafety in a thin weak foot, the ſame may as certainly be done in a ſtrong foot, with more eaſe and expedition, which indeed is frequently the caſe.

To form a right judgment of what may be called a good hoof, it muſt neither be too large nor too ſmall in proportion to the ſize of the leg: at the ſame time, its ſhape muſt be regular, gradually enlarging from the coronet towards its baſis; the cruſt ſmooth, even, and free from ſeams, cracks, or wrinkles; the ſole ſtrong, and a little hollow; the heels firm and open; the frog tough, ſound, and dry.

Wounds in the Feet.

Sect. XL. *Wounds in the Feet.*

Wounds in the feet happen frequently, but chiefly from want of proper care, and treating them injudiciouſly when they are firſt inflicted.

1. Wounds upon the coronet, or top of the hoof, when ſuperficial, are eaſily cured, if not neglected or improperly treated. But the moſt ſimple wound, by bad management or neglect, may, eſpecially if the horſe ſhould happen at the time to be in a bad habit of body, be attended with dangerous conſequences: therefore, however trifling they may at firſt appear, they ſhould be treated with attention.

When large deep wounds are inflicted upon the coronet, from which may be apprehended a great inflammation, and its conſequences; to prevent theſe evils as much as poſſible, it will be neceſſary to have recourſe to bleeding, and, at the ſame time, to give ſuch internal remedies as are recommended in inflammatory caſes; cooling ſalts, glyſters, *&c.* together with a low ſoft diet, keeping the hoof moiſt and ſoft with emollient poultices applied around it, which may be made of turnip, mallows, or even bran and water.

Deep wounds upon the coronet are generally made by long ſharp caukers upon the heels of the ſhoes of the oppoſite foot, penetrating downwards between the coffin-bone and the hoof. In this caſe, as there is no depending orifice or paſſage for the matter contained in the wound to be diſcharged downwards, there is great danger of a fiſtula or ſinuous ulcer being formed; to prevent which, an artificial drain or opening muſt be made through the hoof, firſt raſping or paring it very thin upon the outſide where the perforation is to be made; then introduce a ſharp-pointed inſtrument, a little bent, into the orifice of the wound, and, paſſing it to the bottom, force it outwards. This operation will be performed with leſs pain to the animal, if the inſtrument be concealed within a canula or hollow tube, till it reaches to the bottom of the wound; when the perforation is to be made by puſhing it beyond the extremity of the canula; and, by applying a bandage pretty tight round the coronet, the ſides or lips of the wound may be brought into contact and healed up, or a ſeton may be introduced, and continued till the inflammation, ſwelling, *&c.* is removed. If this operation be too long delayed, the matter confined in the wound forms a number of ſinuſes or fiſtulæ, which frequently run in different directions under the hoof, and require a large portion of it to be cut away before they can be healed up, leaving an ugly blemiſh, and a weakneſs or tenderneſs on that part of the hoof, which never admits of a thorough cure. But, by treating it in the manner now mentioned, the annular ligament may be preſerved entire, and a falſe quarter avoided: and, although there may remain an horizontal crack or fiſſure in the hoof where the perforation was made; yet, as the hoof grows downwards, it will likewiſe go along with it, and wear out, without leaving a blemiſh or any other bad conſequence.

When the capſular ligament of the coffin-joint is wounded or perforated by any inſtrument, ſo as to admit the external air into its cavity, the glands there ſituated inflame; and, in place of ſecreting a lubricating mild liquor, they diſcharge a ſharp ichorous fluid, which deſtroys and corrodes the very cartilages or griſtles upon the ends of the articulated bones, which at laſt grow together, and form what is termed an *anchyloſis*, and of courſe lameneſs. There are many farriers who boaſt of their having cured wounds in the joints after they were affected with that ſymptom which they call a *joint-water*, that is, a diſcharge of the ſynovia or mucilaginous fluid contained within the cavity of the joint. But what they commonly call a *joint-water*, is only a yellow ſerum or lymph, which is frequently to be met with iſſuing in great abundance from wounds in the legs; and not the ſynovia or fluid contained within the cavity of the joint. Notwithſtanding wounds of this kind happen frequently; yet, ſo little are the generality of practitioners acquainted with the nature of them and their conſequences, that they make no diſtinction betwixt them and thoſe of a more ſimple nature. Hence, therefore, they find themſelves frequently miſtaken in prognoſticating the cure of a wound, to appearance of a very ſimple nature.

It is a certain fact, confirmed by experience, that, when the capſular ligament of any joint is perforated or cut through, there is but litttle chance of a complete cure being effected, ſo as the horſe may be uſeful for the ſaddle or carriage; although, in other reſpects, to thoſe who are willing to be at the expenſe, he may, if a ſtrong horſe, be uſeful in ſome kinds of drudgery.

As to the mode of dreſſing wounds of this kind, all that art can do, is to prevent, as much as poſſible, a violent inflammation or flux of humours to the affected limb, by blooding, glyſters, cooling ſalts, together with a low ſoft diet, applying digeſtive poultices to the wound, and injecting now and then into the cavity of the joint tincture of myrrh.

2. Wounds upon the coronet towards the back part of the foot or heel, which are commonly called an *over-reach*, are occaſioned by the toe of the hind-ſhoe on the ſame ſide cutting the fore-heel. Some horſes are much addicted to this, owing entirely to their manner of going, *viz.* the hind-foot moving in the ſame line of direction with the fore-foot; in riding faſt, the fore-foot not giving place in time to the hind-foot, ſtrikes againſt the fore-heel: hence ſome horſes, in trotting, make a clattering noiſe with the hind-ſhoes ſtriking againſt the heel of the fore ones; hence, likewiſe, many horſes are thrown down by the ſame cauſe.

Although an over-reach is a wound of the complicated kind, being at the ſame time a contuſion or bruiſe together with a wound; yet they are nowiſe dangerous, and are eaſily cured by treating them in the manner hereafter mentioned; for, in two or three days, when the wound comes to ſuppurate properly, the bruiſed or dead parts fall off, and only leave a larger ſurface of a wound than was at firſt apprehended.

With reſpect to the dreſſing proper for recent wounds, farriers are too much prejudiced in favour of certain balſams, ointments, and tinctures; and too ſanguine in the belief of their ſuppoſed ſpecific virtues, the healing qualities of which they flatter themſelves are irreſiſtible. But the truth is, all that art can do in the healing of wounds, is to remove every impediment which may obſtruct the uniting of the divided parts, and to forward the formation of laudable pus or matter; that being once effected, the reſt is performed by nature, which is ſelf-ſufficient. All the balſams and remedies which are ſaid to generate new fleſh, in fact only aſſiſt nature by excluding the external air, keeping the wounded parts warm, and confining the ſecreted humours, which, by remaining there a due time, are converted into laudable matter, which is the balſam of nature's preparing. Therefore, the moſt approved and rational method of treating recent wounds is, to endeavour to bring them to a ſuppuration or diſcharge of laudable matter; for which purpoſe, poultices are moſt eligible, as they may be eaſily made more or leſs of a digeſtive quality, by melting and mixing any proper digeſtive ointment with the poultice whilſt warm.

1. *Digeſtive Ointment.* Take common turpentine and hog's lard, of each equal parts, melted together.

This ointment may be made ſtronger or weaker, by diminiſhing the one ingredient and increaſing the other; and is very proper to be mixed with poultices, in order to keep them ſoft and pliable.

2. *Digeſtive Poultice.* Take oat-meal or coarſe wheat-flour; digeſtive ointment, two ounces; beer-grounds, a ſufficient quantity: boil the whole to the conſiſtence of a poultice. The quantity of the ointment may be increaſed or diminiſhed in proportion to the ſize of the poultice.

The experience the author has had of the good effects of poultices of this kind in recent wounds, makes him recommend them as preferable to any other mode of dreſſing, for promoting a quick ſuppuration, and leaving a ſmooth even cicatrix.

3. *Emollient Poultice.* Take oat-meal, or coarſe wheat-flour, and lintſeed powdered, of each half a pound. Boil them in milk or water to the conſiſtence of a poultice: to which add of ſal armoniac, in powder, one ounce.

This emollient poultice may be applied when there is a great heat, inflammation, or ſwelling, attending wounds; and by the addition of freſh butter, lard, or oil, may be made of a more relaxing nature.

Many people are indeed prejudiced againſt the uſe of poultices, from a wrong notion, that they (as the phraſe is) draw humours to the wounded part; but the abſurdity of this way of reaſoning will be evident to thoſe who are acquainted with the healing art.

"Poultices (ſays Mr Bartlett) are of ſuch real and extenſive uſe in farriery, that we thought the compoſition of them could not be too general. How ſimple ſoever the ingredients may appear to ſome, (which are generally at hand), yet they will be found to anſwer moſt intentions, where preſent eaſe is to be obtained by warmth, ſoftening, and relaxing the injured part. Many are the caſes which demand ſuch aſſiſtance, as recent ſwellings, inflammations, treads, bruiſes, cracked and ſwelled heels and feet, burns, ſcalds, bruiſed and lacerated wounds from ſtumps, thorns, glaſs, nails, &c. which laſt are much better treated with ſuch ſimple emollient applications, than by hot oils or ſcalding plaſters dropt into the wounds; which, under the abſurd notion of drawing, but too often ſear up the mouths of the veſſels, hinder digeſtion, and conſequently increaſe both pain and inflammation. In ſhort, it is certain that very great ſervices are daily done by the uſe of poultices, not only in thoſe diſorders to which the human body is incident, but alſo in thoſe wherewith the brute part of the creation is afflicted. One advantage which they have over moſt outward applications is peculiar to them, that they convey and retain an additional heat, beſides what is often in the ingredients; and as moſt of them have alſo ſomething emollient in their compoſition, they muſt neceſſarily ſoften and relax the ſkin and veſſels, abate tenſion, attenuate and thin viſcid and obſtructed juices, ſo that their return into the common courſe of circulation, or diſcharge by the pores of the ſkin, muſt in general be much better anſwered by poultices than by other methods."

Poultices may be continued till ſuch time as the wound appears to be well digeſted, (that is, a kindly ſuppuration of white well-concocted matter), look ſmooth and equal, free from cavities or excreſcences of proud fleſh; in that caſe, the uſe of poultices may be left off, and the ſurface of the wound may be ſprinkled over with the following mild eſcharotic powder.

4. Take burnt limeſtone, that breaks down on being expoſed to the air without water, three ounces; Armenian bole, one ounce; rubbed together in a mortar, and put through a fine ſieve.

After the wound is ſprinkled with this powder, a pledget of dry lint may be fixed gently over it; and, when the ſurface of the wound is nearly equal with the ſkin, the powder will be ſufficient, without any cloth or covering.

3. There is another ſpecies of wounds to which the feet are much expoſed, called *punctures*, on account of their ſmall orifice, as the parts immediately after the wound is inflicted readily cloſe up, whereby it becomes difficult to know the depth of the wound. They are generally occaſioned from treading upon ſharp ſtones, broken glaſs, ſharp bones, and nails, and likewiſe from nails in ſhoeing; either of theſe perforating the ſole or frog, and wounding the internal parts of the foot; which, from their ſituation and confinement within the hoof, are attended with the moſt violent pain and inflammation, which are frequently increaſed by the injudicious method generally obſerved in treating theſe wounds when firſt inflicted, by the application of hot corroſive oils poured into the recent wound, in order to deaden it, which is productive of the worſt of conſequences. Thus, a fine young chaiſe-horſe, upon a journey, was pricked with a nail in ſhoeing; which being immediately obſerved, the farrier poured into the wound oil of vitriol. The horſe continued very lame; and, upon the third day, he gave up, not being able to travel any longer. The leg, immediately above the hoof, ſwelled to a moſt enormous ſize, broke out in different places, and diſcharged an incredible quantity of bloody matter, by which the whole limb was waſted, and the horſe rendered entirely uſeleſs.

Punctures or pricks from nails in ſhoeing, are commonly ſaid to proceed from ignorance or blundering. This may ſometimes be the caſe; but, at the ſame time, it is an accident that may, and indeed does, happen to the moſt expert artiſt; and it is ſurpriſing, conſidering the narrow ſpace there is in ſome hoofs for driving nails, that it does not happen more frequently. When it is diſcovered in time, it is eaſily cured, by opening a paſſage for the matter downwards, and dreſſing it with any digeſtive ointment or poultice, and keeping the foot moiſt, by applying an emollient poultice all round the hoof. But when it is overlooked, or a fragment of the nail remains in the wound, the inflammation increaſing, it at laſt ſuppurates. The matter accumulating, and not finding a paſſage downwards, from the natural formation of the hoof, it moves upwards to the coronet or top of the hoof, and forms a round tumour, which afterwards breaks out and degenerates into a moſt malignant ulcer, commonly termed,

4. A *Quittor-bone*. This tumour is attended with great pain and inflammation, and a conſiderable ſwelling round its baſis. The method of cure commonly practiſed, and indeed recommended by authors, eſpecially Dr Braken, is to bore a number of holes into the ſubſtance of the tumour with a hot iron, pointed pyramidally; and to introduce into theſe holes ſmall pieces of corroſive ſublimate, (ſome even uſe arſenick), which corrodes and deſtroys the fleſh for ſome ſpace around them, and at laſt ſeparates from the ſound parts, in a hardened maſs of dead mortified fleſh, called a *core*, which falls off and leaves a large ſurface of a wound. But, frequently, a ſecond or ſometimes a third operation is found neceſſary, before the fiſtula or ſinus can be opened to the bottom, and the proud fleſh totally overcome, which grows very luxuriantly, and renders the cure tedious, uncertain, and very painful to the animal. Therefore, as this method of cure is attended with ſo many inconveniences, and is even dangerous from the quantity of ſublimate, &c. made uſe of, which may as readily deſtroy the ligament of the joint, bones, &c. as the ſubſtance of the tumour, it ought never to be uſed but with caution, and when other means have failed, as it likewiſe endangers the life of the horſe. The knife ſeems far preferable: firſt tie a ligature round the fetlock, in order to ſtop the bleeding; and, with a crooked ſharp knife, cut out the tumour to the bottom; afterwards dreſs it like a freſh wound, till it is healed up.

In ulcers of this kind, as there are a number of ſinuſes or fiſtulæ which run in different directions underneath the hoof, it is hardly poſſible to avoid deſtroying the annular ligament which lies below the coronet, and cutting away a large portion of the hoof; yet, in many caſes, (eſpecially when there is an opening in the tumour), the method propoſed, at the beginning of this ſection, for curing the deep wounds upon the coronet with ſeton, may be firſt tried; and, if that does not ſucceed, either of the operations above mentioned may be performed.

Punctures differ little or nothing, in the manner of treating them, from wounds; only the ſole or frog ſhould be ſcraped thin all round the orifice of the wound, which, at the ſame time, if too ſmall, ſhould be enlarged, and the digeſtive poultice applied, taking care that no fragment or extraneous ſubſtance remain in the wound, and keeping the whole hoof moiſt and ſoft with emollient poultices around it; and, in caſes attended with violent pain, recourſe muſt be had to ſuch internal remedies as are proper in inflammatory caſes, ſuch as the following mixture by way of a drink, in order to prevent, as much as poſſible, an inflammation, or a flux of humours to the afflicted limb, bleeding being firſt premiſed, together with uſing a low ſoft diet.

5. Take ſalt of nitre, two ounces; common treacle, two ounces. Diſſolve in a quart of water.

It will be neceſſary to repeat this draught morning and evening; if the horſe ſhould ſhew any uneaſineſs, or appear griped, the quantity of water may be increaſed, or the ſame quantity of nitre may be given the horſe in a maſh of bran twice a-day, if it does not cauſe him loath his food. If the coffin-bone ſhould be wounded and turns carious, it will be tedious to wait for an exfoliation, as, from the ſpongy texture of this bone, it exfoliates but ſlowly: therefore, if it can conveniently be done, the carious parts may be ſcraped off with a knife, and afterwards dreſſed with pledgets of tow dipped in the tincture of myrrh; and let the poultice be applied above it.

In punctures, as above deſcribed, it is a common practice to pour into the wound hot corroſive oils, (ſome even run into the wound an iron nail made red hot), in order, as the phraſe is, to deaden the parts. In ſuperficial or ſlight wounds, when perhaps little more than the hoof is wounded, the application of hot oils can hardly be very hurtful. But the barbarous method of puſhing a hot nail into a recent wound, cannot fail of being attended with bad conſequences, as the cure is unqueſtionably worſe than the diſeaſe. But, at all events, when the puncture is deep, either of theſe cruel methods is extremely hurtful. The wound is ſaid to be of the moſt inveterate or deſperate kind; when, in fact, the bad practice of injudicious applications, &c. eſcape the juſt cenſure they deſerve.

5. *Contuſions* or *bruiſes* happen frequently on the coronet or top of the hoof, from the treading of other horſes feet, which will occaſion lameneſs; although, at the ſame time, no external mark of violence will appear on the coronet, farther than a little ſwelling, or the horſe will ſhow a ſenſe of pain when the affected part is touched or preſſed upon. The following poultice in this caſe may be applied with ſucceſs, if continued for ſome time.

6. Take thick lees of wine or vinegar, one pint; crude ſal ammoniac, two ounces; oat-meal or bran, ſufficient to make it of a due conſiſtence. Diſſolve the ſal ammoniac in the lees firſt.

Before concluding this ſection, it may not be improper to mention the following rules, which ought carefully to be attended to by every practitioner. 1. The firſt thing to be obſerved in dreſſing of wounds is, to remove all foreign bodies, (if it can be done with ſafety), all lacerated or torn parts, whether of the fleſh or of the hoof, &c. which, from their being left in the wound, would greatly impede the cure. 2. All wounds ſhould be carefully inſpected at every dreſſing, obſerving attentively whether any alteration has been made on their ſurface, whether they be clean at the bottom, and free from any extraneous ſubſtance that may hinder or retard the cure. 3. Whatever appears mortified, or any fungous or proud fleſh, muſt be removed, either by ſuppuration, by the knife, or by cauſtic. 4. Cramming wounds with hard tents, or ſyringing them frequently with ſpirituous tinctures, are extremely hurtful. The former increaſes the pain and inflammation, &c. the latter produces a callus upon the internal ſurface of the wounds, which prevents their healing. 5. The dreſſings of wounds ſhould lie ſmooth and eaſy upon the parts. 6. Over-tight ligatures or bandages ſhould be carefully avoided. 7. As wounds in the feet or legs, for obvious reaſons, are more

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more difficult to heal than on any other part of the body; therefore, reſt and a wide ſtall are abſolutely neceſſary, together with a low regimen or ſoft diet, in order to keep the body cool and open.

SECT. XLI. *Of that Diſeaſe in the Feet commonly called* FOUNDERED.

THE term *foundered* is frequently applied to lame horſes in a very vague manner, and without any determined or fixed meaning: for, when a horſe ſhows any defect or impediment in moving his fore-feet, he is then pronounced to be foundered, whether he really has been ſo or not; that is, according to what is commonly underſtood by that term, owing to the want or neglect of not making proper diſtinctions of the different diſeaſes in the feet. If we conſult authors who have treated upon this ſubject, we ſhall find their accounts of it very dark and imperfect; they bewilder the reader, and convey but a very indiſtinct idea of the nature of the diſeaſe: hence many errors are committed in practice, to the deſtruction of a number of valuable horſes, which otherwiſe, by proper management, might have been rendered ſound and uſeful. When a horſe is firſt attacked with this diſorder, he ſhows a great reſtleſſneſs, is hot and feveriſh, heaves much at the flanks, breathes quick, has a quick ſtrong pulſe, and groans much when moved about; at the ſame time, he ſhows ſymptoms of the moſt violent pain, ſometimes in one, but more frequently in both fore-feet; for which reaſon, he lies down much; but, when forced to move forwards, he draws himſelf together, as it were into a heap, by bringing forward his hind-feet almoſt under his ſhoulders, in order to keep the weight of his body as much as poſſible from reſting upon his fore-feet. In ſtepping forward, he ſets his heel down firſt with great caution, as afraid of touching the ground. This laſt ſymptom ſhould be particularly attended to, as from it we may conclude with certainty that the chief ſeat of the diſorder is in the feet. The hoofs at the ſame time are exceedingly hot; and, if water is thrown upon them, they dry inſtantly: if an attempt is made to pull off any of the ſhoes, the horſe ſhows great uneaſineſs upon the leaſt twiſt or preſſure made upon any part of the foot, and a great unwillingneſs to ſupport the weight of his body upon the other foot, eſpecially when they are both alike affected.

It is univerſally allowed, that the cauſe of this diſeaſe proceeds from too violent exerciſe, ſuch as riding very hard upon ſtony grounds or turnpike roads, and that young horſes are moſt liable to it; and to theſe we may likewiſe add, unequal preſſure upon the internal parts of the foot, from the concave or hollow form of the common ſhoes. All theſe cauſes combined together, when a horſe is of a plethoric or full habit of body, and not accuſtomed to violent exerciſe, occaſion this diſeaſe in a greater or leſſer degree. To form ſome faint idea of this malady in horſes, we may in a great meaſure appeal to what we experience ourſelves in running upon hard ground; for we find, that it occaſions a great heat, attended with a ſmart pain in our feet, which would be greatly increaſed from uneaſy ſhoes, eſpecially if compelled (like horſes) to continue the running for any conſiderable time. The feet likewiſe become turgid and painful after a long day's journey, eſpecially if the perſon is not accuſtomed to travel; and this inflammation frequently terminates in bliſters upon the ſoles of the feet. Hence it is evident, that, in proportion to the habit of body the horſe is in at the time, and the violence of the labour or exerciſe he has undergone, the inflammation in the internal parts of the foot will be more or leſs violent, and attended with all the ſymptoms already mentioned.

This diſeaſe, then, appears from the ſymptoms attending it, and the effects it afterwards produces in the feet, to be, in its firſt ſtage, an inflammation of the internal parts of the feet, ariſing from the violent exerciſe, which occaſions a more than ordinary determination of the blood to the feet: hence that rapid circulation of the blood in the veſſels within the hoof, which frequently terminates in a rupture of theſe veſſels, and of courſe an extravaſation of the blood, and, in ſome caſes, a total ſeparation of the horny ſubſtance of the hoof from the aponeurotic fibres upon the fore part of the coffin-bone; whilſt in others, where it has been leſs violent, a concretion or growing together of the parts within the hoof has taken place, ſo as to appear upon diſſection one ſolid maſs; and hence lameneſs.

Thus, a young chaiſe-horſe, after a hard day's work, was attacked with all the ſymptoms already mentioned, and was treated in the common manner as above related, that is, rowelled, *&c.* In a few weeks after the diſeaſe had taken its courſe in the ordinary way, he was put under the author's care. The ſole, a little before the point of the frog in one of his fore-feet, became ſoft; and having a curioſity to ſee the cauſe of it, the author cut away the ſole, which was but thin, and found a cavity containing a reddiſh coloured liquor: after removing the ragged parts of the hoof, a large tranſverſe opening ſhowed itſelf, into which a probe was introduced upwards between the coffin-bone and the hoof; the connection between the tendinous fibres upon the ſurface of the coffin-bone and the hoof, was deſtroyed at the fore-part or toe; the bone, loſing part of its ſupport, preſſed down upon the horny ſole, and produced that ſwelling or convexity of its ſurface, which is called a *high*, *round*, or *pumice ſole*. The hoof loſt its former ſhape, growing narrow towards the toe, with a preternatural thickneſs of the horny ſubſtance of the cruſt, whilſt the quarters or ſides of the hoof were decayed, thin, and full of deep wrinkles, together with a hollowneſs upon the ſurface of the upper part of the hoof, the whole foot having a diſeaſed appearance. When the horſe had recovered ſo far as to be able to walk, in going foreward he threw out his legs well before him, but drew them backwards before he ſet his foot to the ground; ſetting the heel down firſt with great caution upon which he reſted moſt, the toe being turned a little upwards. From this ſymptom only, we may judge with certainty, even though at a diſtance, upon ſeeing a horſe walk, whether he has ever been foundered or not.

This diſeaſe proves ſtill more violent, and indeed ſometimes fatal, if the horſe has been allowed to ſtand in cold water when his feet are overheated. Thus, a ſaddle-horſe, after being rode very hard, was turned looſe into a ſtable-yard all over in a ſweat; he went immediately into the water-pond, where he was ſuffered to ſtand for a conſiderable time in very cold weather: a few hours afterwards, he was ſeized with a moſt violent fever, and a great pain in his fore-feet: he lay upon the litter for ſome days in the greateſt agony; and at laſt both his hoofs dropt off, occaſioned by a mortification brought upon the parts from the application of the cold water, which rendered him entirely uſeleſs.

From what has been ſaid with reſpect to this diſeaſe, it is evident, that as the circulation is greatly increaſed, and the current of blood chiefly determined toward the fore-feet, attended with ſymptoms of the moſt violent pain, we may thence conclude, that there is an inflammation in theſe parts: therefore, the cure muſt firſt be attempted by diminiſhing the circulation of the blood, giving cooling ſalts internally, as N° 5. glyſters, an opening diet, and plenty of diluting liquor four or five times a day, together with emollient poultices applied warm all round the hoofs, in order to ſoften them, and keep up a free and equal perſpiration; obſerving, that his ſhoes be eaſy upon his feet; but by no means to pare the ſole or frog to that exceſs which is commonly done in caſes of this kind, farther than cleaning away the hardened ſurface of the ſole and frog, in order that the poultice may have the deſired effect, by increaſing the perſpiration through the pores; and to avoid all manner of greaſy or oily applications to the hoofs, for the reaſons already mentioned.

In all violent inflammations, there is nothing which contributes more to give immediate relief, than plentiful bleeding timeouſly performed; and which ought by no means to be neglected, or too long delayed: for, in caſes of this nature, although the fever may be ſo far overcome by ſtrength of conſtitution, or prevented by medicines from deſtroying the life of the animal; yet the effects of it will ever afterwards reremain, and, of courſe, the horſe will be lame for life. But, in order to judge properly when this operation may be neceſſary, the pulſe muſt be attended to, the knowledge of which is of the utmoſt importance in the practice of farriery, and ſhould be more generally ſtudied, as it is the only criterion or rule by which we may be directed when bleeding is neceſſary, or when it ought to be avoided. But, when this operation is neglected, and the cure is firſt attempted by rowels, &c. it is a long time before they can come to a proper ſuppuration, on account of the violence of the fever. Hence, in place of ſuppurating, they ſometimes turn into a gangrene, by which many horſes loſe their lives. But, at all events, before the rowels could have any effect, even allowing they were to ſuppurate in the common time, (which is about three days), the inflammation within the hoof will by that time have taken place, and its conſequences will follow, to the ruin of the feet, and, of courſe, the ſoundneſs of the horſe.

The manner in which a horſe walks or ſtands upon his fore parts, when affected with this diſorder, has induced many practitioners, &c. to conclude, that the ſhoulders are affected: hence they ſay a horſe is foundered in the body; and that drains, ſuch as rowels, are the only proper remedies. But granting there was a ſtiffneſs, &c. all over the body, which is frequently the caſe in the beginning of inflammatory fevers, bleeding ought to be premiſed, as the firſt neceſſary ſtep towards the cure.

Sect. XLII. *Hoof-Bound.*

This complaint affects the hoofs differently, according to their natural ſhape, and the treatment they are expoſed to, whether from injudicious ſhoeing, keeping the hoofs too hot and dry, or paring the ſole and binders at every time they are ſhoed. Some are affected with a circular contraction of the cruſt, compreſſing the whole foot. In others, the cruſt is contracted at the coronet only, compreſſing the annular ligament, &c. A third kind is, when either one or both heels are contracted; hence, therefore, in proportion to the degree of contraction, the internal parts of the foot are compreſſed, and the horſe becomes more or leſs lame.

It has been already obſerved, ſect. xxxix. that deep-cruſted narrow hoofs, or what are commonly called *aſſes hoofs*, are naturally diſpoſed to this malady: when they become diſeaſed, they are eaſily known from their appearance, as they are ſmaller in proportion than the legs, and frequently ſmaller at their baſis than at the coronet; the cruſt of the heels is high, thick, and ſtrong; the frog waſted and rotten; the hoofs are almoſt perpendicular; the horſe moves in pain, ſteps ſhort and quick, and trips and ſtumbles frequently; it is not uncommon that one foot only is affected, which then appears conſiderably ſmaller than the other.

This diſeaſe is haſtened and brought on by paring and hollowing out the ſole and binders at every time the ſhoes are renewed, from a miſtaken notion of widening the heels; hence they are thereby made ſo very thin, that the cruſt at the extremity of the heels may be forced almoſt cloſe to one another even with one's fingers: and what greatly forwards the complaint, is the form of the ſhoes commonly uſed, which are made hollow; for this practice of hollowing the ſhoes ſo univerſally prevails, that, without any regard to the ſhape of the ſole, whether it be flat or otherwiſe, the ſhoe is made concave or hollow upon that ſide which is placed next the foot. Hence the outer edges of the concave ſhoes force the cruſts at the heels nearer to one another; which being there retained, the contraction of the hoof becomes general, and confirmed beyond the power of art or remedy.

In the ſecond ſpecies of this complaint, the hoof acquires a particular ſhape, which Mr Gibſon, in his Farriery, compares to that of a bell; that is, the hoof appears contracted and tight round the coronet and inſtep, but ſpreads wider downwards to its baſis; the hoof in other reſpects looks well and ſound. This is generally occaſioned by keeping the horſe ſtanding for a long time together in the ſtable upon hot dry litter, without moiſtening and cooling the hoofs, allowing them at the ſame time to grow to a preternatural ſize both in length and breadth; hence, from the great ſtrength, the rigidneſs and dryneſs of the under part of the hoof, a preternatural ſtricture or preſſure is made by the hardened cruſt at the coronet, which compreſſes the annular ligament, and parts near it.

The third ſpecies of this malady is, when either one or both heels are contracted. This frequently happens even in all kinds of hoofs, but more eſpecially in thoſe that are flat, from the uſe of concave or hollow ſhoes, together with cutting out the ſole and binders at every time

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time the horſe is ſhoed. But it more frequently happens, that the inſide heel only is contracted, from the natural weakneſs of that part of the hoof: hence the weight of the limb, &c. preſſing upon the inſide cruſt at the heel, it is inflected or bended inwards; by which, together with the concave form of the ſhoe, and loſs of ſubſtance from paring, &c. the diſorder is increaſed, the cruſt of the heels becomes contracted, and compreſſes that quarter of the foot, and of courſe occaſions lameneſs.

With reſpect to any particular method of cure to be obſerved in removing this diſeaſe, all that can be ſaid is, That, as it is one of that kind which comes on gradually and perceptibly, it may by proper care and management, when properly attended to, be prevented. But, when once it becomes confirmed, it never will admit of a thorough cure. Nevertheleſs, it may be ſo far palliated as to render a horſe in ſome degree ſounder, by keeping the hoofs cool and moiſt; as, in this caſe, they are naturally diſpoſed to be very hot, dry, and hard, his ſhoes ſhould be flat, narrow, and open heeled, the hoofs never greaſed nor oiled, the ſoles never pared. But, as the cruſts of the heels in theſe hoofs are preternaturally high and ſtrong, they ſhould always be pared down till they are lower than the frog, that it, if poſſible, may reſt upon the ground. This operation will tend to remove that ſtricture from the heels and frog, which will greatly relieve them. But many people, adhering too ſtrictly to that general rule, which, from inattention, has creeped into practice, *viz.* of paring down the toes, and keeping the heels entire, without reflecting upon the ſhape or natural formation of the particular hoofs, continue the ſame practice upon deep-cruſted, high-heeled hoofs, which is only neceſſary to be obſerved in long-toed hoofs with low heels, and thereby this diſorder is greatly increaſed; the weight of the body is likewiſe thrown forewards, by which the horſe ſtands too much upon his toes; and hence the leg-bones, from the aukward habit of the horſe's ſtanding, become bent at the joints, and occaſion what is called *knuckeling* or *nuckeling*.

The ſecond ſpecies of this complaint, is when the cruſt at the coronet becomes contracted; and, compreſſing the annular ligament, &c. occaſions lameneſs, the hoof acquiring that ſhape formerly compared to that of a bell. Different methods have been tried and recommended for the cure. Mr Gibſon propoſes to make ſeveral lines or raſes on the fore-part of the hoof with a drawing knife, almoſt to the quick, from the coronet down to its baſis, and turning the horſe out to graſs: others, after this operation is performed, ſcrew the heels wide, by means of a ſcrewed ſhoe: a third method practiſed is, to draw the ſole, and divide the fleſhy ſubſtance of the frog with a knife, and keeping it ſeparated by the ſcrewed ſhoe above mentioned: a fourth method in uſe, is to make the inner-rim of the ſhoe-heel very thick on the under ſide, (its upper ſurface being quite flat); and by making it reſt upon the binders and ſole at the extremity of the heels, by preſſure from the weight of the body, the heels are forced to recede to a greater diſtance from one another. Either of theſe methods may indeed in a ſmall degree widen or expand the horny ſubſtance of the cruſt, and may be of uſe in recent contractions. But, when once it has become confirmed, and is of ſome ſtanding, no means whatever can then reſtore the internal parts to their primitive ſtate; for, as the contraction takes place, the tender parts within the hooof being compreſſed, loſe their tone, and diminiſh in their ſize. The blood-veſſels become impervious; hence a decay or waſting of the whole foot, and not unfrequently a concretion of the parts, and, of courſe, the impoſſibility of the horſe ever becoming ſound. But, as it has been obſerved, that the cauſe of this ſpecies of the complaint now under conſideration proceeds from allowing the hoofs to grow to an extraordinary ſize, and keeping them too hot and dry, by which they acquire a rigidity and dryneſs occaſioning a preternatural compreſſion upon the coronet; to remove which, (as the caſe will only admit of palliation), the ſurface of the hoof at its baſis muſt be pared down till the blood appears, the thick ſtrong cruſt upon the outſide towards the toe raſped in the ſame manner, and the horſe turned out to graſs in ſoft meadow-ground till the feet recover. But it muſt be obſerved, that, if both hoofs are alike affected, one of them at one time only ſhould be treated in the manner directed, as a tenderneſs will remain for ſome days, which might prevent the horſe from walking about in ſearch of food.

Hoof-bound.

The third ſpecies is a contraction of one, or ſometimes of both heels, in flat feet, from the uſe of concave ſhoes, &c. Where it has not been of a very long ſtanding, it may, by proper management, be greatly relieved, by laying aſide the uſe of concave ſhoes, and refraining from paring the ſole, &c. But to remove the ſtricture of the hoof more immediately, the whole contracted quarter of the cruſt near the heel muſt be raſped or pared to the quick, from the coronet to its baſis, cloſe to the frog, taking care to avoid drawing blood, putting on a barred ſhoe, cauſing the ſhoe-bar to preſs upon the frog, keeping the hoof cool and moiſt, or turning the horſe out to graſs. Hence the preſſure from the contracted hoof being removed, and the frog at the ſame time reſting upon the bar of the ſhoe, the contracted quarter is thereby dilated or expanded; the new hoof growing from the coronet downwards, acquires a round, full ſhape, and becomes of its original form.

From what has been ſaid concerning this diſorder in the feet of horſes, it is evident, what little proſpect there is of effecting a thorough cure by art, as the complaint is of ſuch a nature as only to admit of ſome palliation, and, even then, in ſome very favourable caſes only. Nevertheleſs, it is practicable to prevent contractions in the hoofs from taking place, even in thoſe hoofs which are ſeemingly diſpoſed that way from their ſhape, &c. by obſerving the rules already laid down, *viz.* by keeping the hoofs moiſt and cool, which is their natural ſtate; uſing flat ſhoes, from which the hoofs can acquire no bad ſhape; allowing the ſole and frog to continue in their full ſtrength, the latter eſpecially to reſt upon the ground; and keeping the cruſt within due bounds, not ſuffering it to grow too long towards the toe, nor too high at the heels.

SECT. XLIII. *Of Corns.*

In the human body, corns in the feet are termed ſo with ſome propriety, from their horny ſubſtance; but, what are called *corns* in the feet of horſes, are very improperly named, as they are quite of an oppoſite nature, rather reſembling contuſions or bruiſes, and not unlike thoſe bruiſes which happen in the palms of the hands and fingers to working people, ariſing from violent pinching, bruiſing, &c. where the ſkin is thick, which appears of a blackiſh red colour, and exceedingly painful at firſt, containing blood; but, in the end, the ſerum or thinner parts being abſorbed, the red particles appear, when the dead ſkin is removed, like red powder. In like manner corns, or rather bruiſes, appear red and *foxy* (as the phraſe is). They are ſituate in the corner or ſharp angle of the ſole at the extremity of the heels, where the cruſt reflects inward and foreward, forming the binders. But, they are more frequently to be met with in the inſide heel, from the manner of the horſe's ſtanding, together with the preſſure or weight of the body, which is greater upon the inſide of the hoof than the outſide. Bruiſes of this kind are exceedingly painful, inſomuch that the horſe ſhrinks and ſtumbles when any thing touches or preſſes upon that quarter of the hoof; hence lameneſs.

This complaint ariſes from different cauſes, according to the ſhape or natural formation of the hoof, together with the treatment they are expoſed to. But the following are the moſt frequent.

1ſt, In flat low heels, from too great a preſſure of the ſhoe-heel upon the ſole, whether from caukers, a too great thickneſs of iron upon the heels of the ſhoe, or its being bended downwards upon the ſole, or the ſhoe made too concave; either of theſe cauſes will produce the ſame effect: for, from the too great preſſure upon the horny ſole, the fleſhy ſole, which lies immediately underneath it, is compreſſed and bruiſed between the ſhoe-heel, the ſole, and the extremities or outward points of the coffin-bone; and hence a contuſion or bruiſe, attended with an extravaſation of the blood, which afterwards gives that part of the ſole a red appearance, and is the reaſon why the ſole on that place never grows up ſo firm and ſolid as it was before, but remains ſoft and ſpongy, forming a lodgment for ſand and gravel, which frequently inſinuates itſelf into the quick, cauſing an inflammation, attended with a ſuppuration or diſcharge of matter, which, if not finding a paſſage below, will break out at the coronet.

2*d*, This complaint is produced in wide open heels, when the hoofs are very thick and ſtrong, from too great a luxuriancy of the binder, which, being inflected or bended downwards between the ſhoe and the ſole, compreſſes the fleſhy ſole, as already mentioned; and hence lameneſs.

3*d*, This malady, in deep narrow hoofs, proceeds from a contraction of the cruſt compreſſing the heels, &c. Hence, it not unfrequently happens in hoofs of this ſhape, that both heels are alike affected, from the ſtricture and preſſure of the hardened cruſt upon the tendinous aponeuroſis, &c. on the outſide of the coffin-bone, which, in this caſe, is bruiſed between the bone and the cruſt; hence the redneſs may ſometimes be traced upwards almoſt to the coronet. In this caſe, no radical cure can take place, as the cauſe which produces theſe bruiſes, &c. will exiſt while the horſe lives, and at the ſame time the horſe will be lame from the contraction of the hoof; but the remedy propoſed in the preceding ſection, by way of palliation for hoof-bound feet, may be of uſe to render the horſe in ſome meaſure more ſerviceable.

With reſpect to the two firſt cauſes, when the bruiſe proceeds from too great a preſſure from the ſhoe-heels, &c. upon the ſole, the ſhoe muſt be made ſo as to bear off the tender part, and likewiſe to ſome diſtance on both ſides of it; for which purpoſe, a round or a barred ſhoe will be neceſſary. The red and bruiſed parts muſt be cut out to the quick, and the hoof kept ſoft with emollient poultices for ſome time. But the texture of the blood-veſſels, and likewiſe that of the hoof at the bruiſed part, being deſtroyed, a ſpongineſs remains afterwards, and, upon the leaſt unequal preſſure from the ſhoe, &c. are liable to a relapſe, never admitting of a thorough cure, and of conſequence ſubject to frequent lameneſs.

Corns or bruiſes in the feet of horſes might, by taking proper care of them, be eaſily avoided: for in thoſe countries where horſes go moſtly barefooted, this malady is not ſo much as known; neither are thoſe horſes that go conſtantly at cart and plough ſubject to them: hence, therefore, this complaint is moſt frequently to be met with in great towns, where horſes go much upon hard cauſeway, having their ſhoes turned up with high caukers on the heels, and frequently renewed, at the ſame time their hoofs being kept too dry and hard, from ſtanding too much upon hot dry litter; hence will appear the neceſſity of complying with what is moſt natural to the hoofs of horſes, namely, coolneſs and moiſture, together with uſing ſuch a form of ſhoe as will preſs equally upon the circumference of the cruſt, and without giving it any bad unnatural ſhape. See Shoeing *of Horſes*.

Sect. XLIV. *Of Running Thruſhes.*

1. A Running Thrush (or Frush), is a diſcharge of a fetid, and ſometimes ichorous, matter, from the cleft in the middle of the frog, affecting one, frequently both, and in ſome caſes all the four feet. But, generally, the fore-feet are moſt ſubject to this diſeaſe. In moſt caſes, it ſeldom admits of a radical cure; but is ſubject to frequent relapſes, occaſioning lameneſs, from the rawneſs and tenderneſs of the parts affected, on being expoſed to ſand, gravel, &c. or in rough grounds, from the heels treading on ſharp ſtones, &c. and when the horſe happens to be of a bad habit of body, they even degenerate into what is commonly called a *canker*.

Running thruſhes, according to Mr Gibſon, "are ſometimes profitable to horſes of fleſhy and foul conſtitutions; becauſe (ſays he) they drain off a great many bad humours." But, however ſalutary or beneficial they may be in ſome particular conſtitutions, yet, upon the whole, they prove extremely troubleſome, on account of the lameneſs and tenderneſs of the feet affected with them; and, where there occurs one caſe in which they may properly be ſaid to become beneficial to the conſtitution, there are a far greater number in which they are hurtful, as they are brought on by the treatment the hoofs are expoſed to, together with the injudicious method generally obſerved in ſhoeing them, particularly in thoſe hoofs that are narrow-heeled, or diſpoſed to be hoof-bound, running thruſhes being always an attendant upon that complaint. But, to explain this more particularly, there is, in the middle of the frog, a cleft or opening, by which the heels in a natural ſtate have a ſmall degree of contraction and expanſion, eſpecially when the horſe treads or preſſes his heel upon the ground, the frog then expands; when, therefore, a horſe is ſhoed with concave or hollow ſhoes, the heels are deprived of that power of expanſion, being conſtantly confined in a contracted ſtate by the reſiſtance from the outer edges of the concave ſhoe, by which the frog is preſſed or ſqueezed on both ſides, by the cruſt of the heels being brought nearer to or almoſt into contact with one another. Hence pain, inflammation, an obſtruction of the blood, &c. (in the fleſhy ſubſtance of the frog), and of courſe that waſting and rottenneſs of its external covering, which, falling off in pieces, leaves the quick almoſt bare: the new frog, growing in detached pieces, never acquires the ſolidity of the former; and hence that rawneſs and tenderneſs which ever afterwards remain, and that extreme ſenſibility of pain when any hard ſubſtance touches that part of the foot, and of courſe ſubject the horſe to frequent lameneſs, There are, no doubt, other cauſes which may be ſaid to occaſion this malady, even in thoſe hoofs that are wide and open at the heels, where there is not the leaſt appearance of a contraction at the heels: but theſe are generally owing to the treatment the hoofs are expoſed to in the ſtable, by keeping them too hot and dry for a long tract of time together, during which the natural perſpiration is greatly obſtructed, by the conſtant application of greaſe or oil to the hardened hoofs, and ſtuffing them up with hot, reſinous, and greaſy mixtures, as tar, turpentine, &c. the horſe being all the while kept at full feeding, and not having proper and neceſſary exerciſe to promote the circulation of the fluids, and to forward the ordinary ſecretions, &c.: the legs ſwell and inflame; at laſt a running in the frog appears; and hence this diſcharge is ſaid to be beneficial to the conſtitution, when in fact it is but too frequently brought on by a ſlothful neglect, and kept up by bad management. Freſh air and regular exerciſe are eſſentially neceſſary towards preſerving horſes in an active healthy ſtate; for running thruſhes, like other diſeaſes to which pampered horſes are ſubject, are not known in thoſe countries where horſes run at large in the fields; neither are they ſo frequently to be met with in the country amongſt labouring horſes, whoſe exerciſe is regular, and whoſe hoofs are much expoſed to coolneſs and moiſture, the natural ſtate of the feet of horſes.

With reſpect to the cure of running thruſhes, it has been hinted, that in moſt caſes, eſpecially where it has been of long ſtanding, affecting all the frogs more or leſs, it is impracticable to eradicate it by any aſſiſtance from art. For inſtance, when it proceeds from contracted narrow heels in thoſe feet which are ſaid to be hoof-bound, it is then an attendant only on that diſeaſe; and therefore cannot be cured without removing the firſt cauſe, tho' then it will only admit of ſome ſmall degree of palliation *. But in thoſe hoofs which are wide and open at the heels, where the complaint is recent, one or both the fore-feet only being affected, and where there is reaſon to ſuſpect that it proceeds from the uſe of concave or hollow ſhoes, or keeping the hoofs too hot, dry, and hard, the cure then may be compleated with eaſe and ſafety, by laying aſide the uſe of concave ſhoes, waſhing the frogs clean after exerciſe, and dreſſing them with Mel Egyptiacum, made as follows.

11. *Mel Egyptiacum.* Verdigris in fine powder, two ounces; honey, ſix ounces; vinegar, four ounces; boil them over a gentle fire till they have acquired a reddiſh colour.

Or a ſolution of blue vitriol.

12. *Solution of vitriol.* Blue vitriol powdered, one ounce; water, one quart:

keeping the hoofs cool and moiſt. But, at the ſame time, recourſe muſt be had to internal remedies by way of revulſion, as purging or diuretic medicines, bleeding being firſt premiſed: if the former is made choice of, twice or thrice will be ſufficient, repeated at proper intervals; but if the latter, which ſeems preferable, they may be continued for ſome time with great ſafety, without loſing one day's work of the horſe.

In ſome caſes, there is frequently not only a diſcharge of fetid matter from the clefts of the frogs; but, at the ſame time, a diſcharge of greaſy like matter from the round protuberances of the heels, and the hollow of the paſtern joints. It will be neceſſary, therefore, to make a diſtinction between the matter diſcharged in this caſe, which appears of a thick, white, clammy, or ſoapy conſiſtence, and that running in the legs commonly termed a *greaſe*, which is of a quite oppoſite quality; the latter by good management will admit of a thorough cure, whilſt the former baffles all the power of medicine.

2. In horſes of a groſs habit of body, eſpecially the heavy draught-kind, running thruſhes ſometimes degenerate into what is commonly called a *canker*. In this caſe, the horny ſubſtance of the frog is ſoon thrown off; the fleſhy parts grow to an immoderate ſize, the luxuriant ſubſtance or ſpongy fleſh having a great number of papillæ or tubercles, which Mr Gibſon compares not improperly to cauliflower, the colour only excepted, which is of a pale red, and ſometimes variegated and tinged with blood; attended with a copious diſcharge of a thin ichorous fetid humour, having a moſt offenſive ſmell. If its progreſs be not ſpeedily ſtopt, the fleſhy ſole, from its vicinity, becomes likewiſe affected; the horny ſole rots, decays, and falls off; the whole foot turns into a kind of quag or bog, (in warm weather full of maggots, which it is almoſt impoſſible to prevent, even with the moſt corroſive dreſſings); the tendons become likewiſe affected, the bones carious, the hoof falls off, and the horſe is rendered uſeleſs. To prevent theſe and the like conſequences, as ſoon as a running thruſh begins to ſhow the leaſt malignant diſpoſition, proper means muſt be uſed to correct the habit of body, and to divert this diſcharge to ſome other outlet, either by purging or diuretic remedies, continued for ſome time, bleeding being firſt premiſed. As to external applications, the firſt thing neceſſary to be done, is to pare down the cruſt till it is lower than the fungus, or growth of the canker, and to remove any hard pieces of the hoof or ſole where-ever it preſſes upon the tender parts; the circular part of the cruſt ſhould be ſurrounded and kept ſoft with an emollient poultice. For dreſſings, the mildeſt eſcharotic powders may be firſt tried, as the following:

13. Take burnt alum powdered, two ounces; blue vitriol powdered, one ounce.

But, when it degenerates into the laſt ſpecies mentioned above affecting the fleſhy ſole, *&c.* the ſtrongeſt corroſive applications will then be neceſſary, and ſometimes hardly ſufficient to keep down the luxuriancy of the fungus. The cauſtic oils are found preferable, as ol. vitriol. aqua-fortis, butter of antimony: either of theſe may be applied once every day; otherwiſe, if neglected dreſſing too long, or to every other day, which is the common practice, the great humidity and moiſture iſſuing from the fungus ſo weakens the force of the ſtrongeſt oils, that they have little or no effect: when theſe ſharp dreſſings ſeem to gain upon the canker, it may be dreſſed with equal parts of red precipitate and burnt alum pounded and mixed together, till ſuch time as the new ſole begins to grow; the purging or diuretic medicines being given at proper intervals till the cure is compleated.

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* See Sect. xliii.

Sect. XLV. *Of Falſe-quarter, and Sand-cracks.*

1. What is commonly called a *falſe-quarter* in the foot of an horſe is a cleft or chink in the ſide or quarter of the hoof, running in a ſlanting direction with the horny fibres of the hoof, from the coronet to its baſis, by which the horny ſubſtance of the cruſt is divided; one part of the hoof being in a manner detached from the other, and rendered unable to ſuſtain its portion or ſhare of the weight of the limb, *&c.* and hence the name of *falſe-quarter:* for, when the horſe ſets his foot on the ground, the chink widens; but, when it is lifted up, the hardened edges of the divided hoof take in between them the tender and ſoft parts, and ſqueeze it ſo as to occaſion frequent bleeding at the chink, and is frequently attended with inflammation, a diſcharge of matter, and, of courſe, lameneſs.

This complaint, notwithſtanding the different accounts commonly given as to the cauſe of it, is in fact the effect of a deep wound or bruiſe upon the coronet, by which the continuity of the parts has been entirely broke off; for we always find, that, when the horny fibres are divided at their roots, they never unite or grow up as before, but leave a blemiſh, more or leſs, in proportion to the ſize and deepneſs of ſuch wounds, &c. We have many inſtances of this, even in the human body; for, when a wound happens at the roots of the nails, whether in the fingers or toes, it occaſions a blemiſh, which continues to grow in the ſame manner afterwards. Hence, it will be evident that no radical cure can poſſibly take place; but we may ſo far palliate the complaint as to render the horſe ſomething uſeful, by uſing a ſhoe of ſuch a conſtruction as will ſupport the weight of the limb, &c. without reſting or preſſing too much upon the weakened quarter; for which purpoſe, a round, or what is called a *barred ſhoe*, will be moſt proper. The ſurface of the hoof on and near the diſeaſed part may be cut down lower than the ſurface of the cruſt upon which the ſhoe is to reſt; or, if the hoof will not admit of being cut down, the ſhoe may be raiſed up from the weak quarter. Either of theſe means will remove the weight of the body from the diſeaſed part, and the horſe will go ſounder.

But, as ſand and gravel is eaſily admitted into the chink, or crack, where, being accumulated and pent up, it irritates and inflames the parts, whereby matter is formed underneath the hoof, which cauſes lameneſs, and which not unfrequently breaks out at the coronet, producing the moſt inveterate ulcers, which become extremely difficult to heal, on account of the ſinus or fiſtula branching out in different directions underneath the hoof. Therefore, horſes with this defect ſhould be carefully obſerved; and, when the thick hardened edges of the chinks or crack grow too high, by which it is ſo much the deeper, and, of courſe, lodges the greater quantity of ſand, &c. theſe edges ſhould be raſped, or pared with a crooked knife, till the ſeam diſappears. But wherever there remains a blackneſs, or appearance of gravel, that part muſt be tracked farther; always obſerving, if poſſible, to avoid drawing blood. The chink or crack thus made ſmooth and equal, no ſand or gravel can lodge in it; and, as the parts will be tender, it will be neceſſary to apply an emollient poultice for ſome days, till the tenderneſs wear off. If the inflammation has been great, and matter formed in the crack, or the parts wounded by the knife in cutting its hardened edges, proud fleſh may riſe and jet out. In this caſe, the hard parts of the hoof near it are to be removed, a digeſtive poultice applied, and, when the inflammation is abated, the proud fleſh may be touched with the following corroſive powder:

Take blue vitriol burnt, two drams; corroſive ſublimate, one dram; rubbed into powder.

2. A ſand-crack is of much the ſame nature with a falſe-quarter; only they run more frequently in an horizontal direction than the latter, on the outſide or ſurface of the cruſt: they are generally the effect of ſlight or ſuperficial wounds upon the coronet, and grow gradually downwards towards the baſis of the hoof, and at laſt are cut or raſped off in the ſhoeing; when they occaſion lameneſs from lodging ſand or gravel, they muſt be treated in the ſame manner as already mentioned for falſe-quarters.

Sect. XLVI. *Of Horſes cutting their Legs in Travelling.*

Horses frequently cut their legs both before and behind, by ſtriking or knocking the hoof when trotting, &c. againſt the oppoſite leg, whereby a wound is made, which is attended with an inflammation, ſwelling, &c. and of courſe lameneſs. The parts commonly wounded from cutting in the fore-legs, are the prominent and back part of the fetlock joint; and under the knee joint on the inſide of the leg. The former is moſt common: the latter only happens to thoſe horſes who raiſe their feet high in trotting; and, as ſuch horſes generally go faſt, this laſt ſpecies of cutting is diſtinguiſhed by the name of the *ſwift* or *ſpeedy cut.*

In the hind-legs, horſes cut themſelves upon the prominent part of the fetlock-joint; and ſometimes, eſpecially thoſe who move their legs too low, cut upon the coronet. But, whether they cut before or behind, it commonly proceeds from ſome of the following cauſes.

1ſt, Injudicious ſhoeing; under which may be included, the hoofs being ſuffered to grow too large and broad, the ſhoe projecting over the inſide edge of the hoof, the clenches or rivets of the nails riſing above the ſurface of the cruſt.

There are a great variety of ſhoes recommended for preventing this complaint, of different conſtructions; but the moſt common are thoſe that are made thick upon the inſide heel. Others have a border or margin turned up upon the inſide of the ſhoe's rim, commonly called a *feather*, which raiſes the inſide of the hoof conſi-

Cutting Feet.

conſiderably higher from the ground than the outſide. Either of theſe ſhoes may be of uſe to a dealer, in order to make a wry-footed horſe appear to ſtand ſtraight upon his limbs; but can have no effect upon a horſe's manner of moving his legs, eſpecially at the time when the foot is raiſed from the ground, and paſſing by the other leg, ſo as to prevent him from cutting. The reaſon why this method of ſhoeing ſeems to ſucceed, eſpecially in the hind-feet, is this: when the ſhoe is made thick upon the inſide heel, which part commonly ſtrikes the oppoſite leg, the ſhoe-nails are removed to a conſiderable diſtance forward from the thick part of the ſhoe, which, at the ſame time, is kept much within the circle of the hoof; and, on that account, it becomes impoſſible that the ſhoe ſhould touch the oppoſite leg. But, to ſhow that this raiſing of the inſide quarter or heel, by a thickneſs of iron in the ſhoe, is not neceſſary to prevent horſes from cutting, the author has frequently cauſed the heel of the ſhoe to be made thinner than common; and, by keeping it within the hoof, it anſwered equally well with the former: he has likewiſe cauſed the ſhoe to be cut in the middle of the quarter, whereby the hoof at the heel was left quite bare; which anſwered the purpoſe ſo much the better, as the foot was the leſs loaded with the additional weight of ſuperfluous iron.

2*d*, The great weight of the concave ſhoes commonly uſed, is likewiſe another cauſe why horſes, that in other reſpects move well upon their legs, do frequently cut and wound themſelves; and to this we may add, the great length of the hoof at the toe, eſpecially in the fore-feet, which is allowed frequently to grow to an unnatural ſize. It has been already obſerved, that great load of iron is by no means neceſſary in a horſe's ſhoe: on the contrary, it becomes a great diſadvantage; for a flat one that is properly conſtructed, and well wrought, that is, well hammered, will wear as long as a concave or hollow ſhoe that is almoſt double the weight of the former. This, at firſt view, will perhaps appear a paradox; but, nevertheleſs, it is a fact: for, as the round or outward ſurface of a concave ſhoe is the only part that touches the ground, and is liable to be wore, it ſoon grows thin, and yields to the preſſure from the weight of the body; and therefore muſt be renewed before the other parts of it are hardly touched, and but little reduced in its original weight. But the ſurface of a flat ſhoe, reſting equally upon the ground, will remain firm upon the hoof, and be ſufficiently ſtrong to ſupport the weight of the body till it wears very thin.

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3*d*, When cutting proceeds from a natural defect, that is, a wrong poſition of the foot upon the leg-bones, whereby the toes are turned too much outward, or too much inward; at the ſame time, if the horſe croſſes his legs much in trotting; in this caſe there is no preventing his cutting altogether, though it may be palliated. Such horſes are by no means fit for journey-riding, being generally addicted both to cutting and ſtumbling.

In the *laſt* place, it may proceed from fatigue or weakneſs. This happens frequently, even to thoſe horſes that deal their legs well (as the phraſe is), eſpecially in young horſes; but they ſoon leave it off when they acquire more ſtrength, and are accuſtomed to their work: moſt people muſt have experienced this in themſelves when boys, as they at that age are very ready to knock their ancles with the heel of the oppoſite ſhoe, which cuſtom wears off as they grow ſtrong. Upon the whole, the beſt general rule that can be laid down for preventing horſes from cutting their legs, is to keep their hoofs round and ſhort at the toe, and from growing too large and broad; to obſerve that the ſhoe does not project over the inſide edge of the hoof; that the clenches or rivets of the nails on the outer ſurface of the cruſt are ſmooth; and above all, that the ſhoe be made light, well worked, and properly proportioned to the ſize of the foot. See SHOEING *of Horſes*.

FAS

FASCES, in Roman antiquity, axes tied up together with rods, or ſtaves, and borne before the Roman magiſtrates as a badge of their office and authority.

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FASCIÆ, in aſtronomy, the belts ſeen on the diſk of the ſuperior planets Mars, Jupiter, and Saturn †.

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FASCIA *Lata*, in anatomy, a muſcle of the leg, called alſo *ſemi-membranoſus*. See ANATOMY, *Table of the Muſcles*.

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Falſe-Quarter.

the fungus. The cauſtic oils are ſound preferable, as ol. vitriol. aqua-fortis, butter of antimony: either of theſe may be applied once every-day; otherwiſe, if neglected dreſſing too long, or to every other day, which is the common practice, the great humidity and moiſture iſſuing from the fungus ſo weakens the force of the ſtrongeſt oils, that they have little or no effect: when theſe ſharp dreſſings ſeem to gain upon the canker, it may be dreſſed with equal parts of red precipitate and burnt alum pounded and mixed together, till ſuch time as the new ſole begins to grow; the purging or diuretic medicines being given at proper intervals till the cure is compleated.

SECT. XLV. *Of Falſe-quarter, and Sand-cracks.*

1. WHAT is commonly called a *falſe-quarter* in the foot of an horſe is a cleft or chink in the ſide or quarter of the hoof, running in a ſlanting direction with the horny fibres of the hoof, from the coronet to its baſis, by which the horny ſubſtance of the cruſt is divided; one part of the hoof being in a manner detached from the other, and rendered unable to ſuſtain its portion or ſhare of the weight of the limb, *&c.* and hence the name of *falſe-quarter:* for, when the horſe ſets his foot on the ground, the chink widens; but, when it is lifted up, the hardened edges of the divided hoof take in between them the tender and ſoft parts, and ſqueeze it ſo as to occaſion frequent bleeding at the chink, and is frequently attended with inflammation, a diſcharge of matter, and, of courſe, lameneſs.

This complaint, notwithſtanding the different accounts commonly given as to the cauſe of it, is in fact the effect of a deep wound or bruiſe upon the coronet, by which the continuity of the parts has been entirely broke off; for we always find, that, when the horny fibres are divided at their roots, they never unite or grow up as before, but leave a blemiſh, more or leſs, in proportion to the ſize and deepneſs of ſuch wounds, &c. We have many inſtances of this, even in the human body; for, when a wound happens at the roots of the nails, whether in the fingers or toes, it occaſions a blemiſh, which continues to grow in the ſame manner afterwards. Hence, it will be evident that no radical cure can poſſibly take place; but we may ſo far palliate the complaint as to render the horſe ſomething uſeful, by uſing a ſhoe of ſuch a construction as will ſupport the weight of the limb, &c. without reſting or preſſing too much upon the weakened quarter; for which purpoſe, a round, or what is called a *barred ſhoe*, will be moſt proper. The ſurface of the hoof on and near the diſeaſed part may be cut down lower than the ſurface of the cruſt upon which the ſhoe is to reſt; or, if the hoof will not admit of being cut down, the ſhoe may be raiſed up from the weak quarter. Eeither of theſe means will remove the weight of the body from the diſeaſed part, and the horſe will go ſounder.

Sand-cracks, &c.

But, as ſand and gravel is eaſily admitted into the chink, or crack, where, being accumulated and pent up, it irritates and inflames the parts, whereby matter is formed underneath the hoof, which cauſes lameneſs, and which not unfrequently breaks out at the coronet, producing the moſt inveterate ulcers, which become extremely difficult to heal, on account of the ſinus or fiſtula branching out in different directions underneath the hoof. Therefore, horſes with this defect ſhould be carefully obſerved; and, when the thick hardened edges of the chinks or crack grow too high, by which it is ſo much the deeper, and, of courſe, lodges the greater quantity of ſand, &c. theſe edges ſhould be raſped, or pared with a crooked knife, till the ſeam diſappears. But wherever there remains a blackneſs, or appearance of gravel, that part muſt be tracked farther; always obſerving, if poſſible, to avoid drawing blood. The chink or crack thus made ſmooth and equal, no ſand or gravel can lodge in it; and, as the parts will be tender, it will be neceſſary to apply an emollient poultice for ſome days, till the tenderneſs wear off. If the inflammation has been great, and matter formed in the crack, or the parts wounded by the knife in cutting its hardened edges, proud fleſh may riſe and jet out. In this caſe, the hard parts of the hoof near it are to be removed, a digeſtive poultice applied, and, when the inflammation is abated, the proud fleſh may be touched with the following corroſive powder:

TAKE blue vitriol burnt, two drams; corroſive ſublimate, one dram; rubbed into powder.

2. A ſand-crack is of much the ſame nature with a falſe-quarter; only they run more frequently in an horizontal direction than the latter, on the outſide or ſurface of the cruſt: they are generally the effect of ſlight or ſuperficial wounds upon the coronet, and grow gradually downwards towards the baſis of the hoof, and at laſt are cut or raſped off in the ſhoeing; when they occaſion lameneſs from lodging ſand or gravel, they muſt be treated in the ſame manner as already mentioned for falſe-quarters.

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FASCINES, in fortification, faggots of ſmall wood, of about a foot diameter, and ſix feet long, bound in the middle, and at both ends. They are uſed in raiſing batteries, making chandeliers, in filling up the moat to facilitate the paſſage to the wall, in binding the ramparts where the earth is bad, and in making parapets of trenches to ſcreen the men. Some of them are dipped in melted pitch or tar; and, being ſet on fire, ſerve to burn the enemy's lodgments or other works.

In the corrupt Latin they uſe *faſcenina*, *faſcennia*, and *faſcinata*, &c. to ſignify the pales, faſcines, &c. uſed to incloſe the ancient caſtles, &c.

FASHION-PIECES, in the ſea-language, the aftmoſt or hindmoſt timbers of a ſhip, which terminate the breadth, and form the ſhape of the ſtern. They are united to the ſtern-poſt, and to the extremity of the wing-tranſom, by a rabbit, and a number of ſtrong nails or ſpikes driven from without.

FAST, or **FASTING**, in general, denotes the abſtinence from food; but is more particularly uſed for ſuch abſtinence on a religious account.

Religious faſting has been practiſed by moſt nations from the remoteſt antiquity. Some divines even pretend its origin in the earthly paradiſe, where our firſt parents were forbidden to eat of the tree of knowledge. But though this ſeems carrying the matter too far, it is certain, that the Jewiſh church has obſerved faſts ever ſince its firſt inſtitution. Nor were the neighbouring heathens, *viz.* the Egyptians, Phœnicians, and Aſſyrians, without their faſts. The Egyptians, according to Herodotus, ſacrificed a cow to Iſis, after having prepared themſelves by faſting and prayer: a cuſtom which he likewiſe aſcribes to the women of Cyrene. Porphyry affirms, that the Egyptians, before their ſtated ſacrifices, always faſted a great many days, ſometimes for ſix weeks; and that the leaſt behoved to be for ſeven days: during all which time the prieſts and devotees not only abſtained from fleſh, fiſh, wine, and oil; but even from bread, and ſome kinds of pulſe. Theſe auſterities were communicated by them to the Greeks, who obſerved their faſts much in the ſame manner. The Athenians had the eleuſinian and theſmophorian faſts, the obſervation of which was very rigorous, eſpecially among the women, who ſpent one whole day ſitting on the ground in a mournful dreſs, without taking any nouriſhment. In the iſland of Crete, the prieſts of Jupiter were obliged to abſtain all their lives from fiſh, fleſh, and baked meats. Apuleius informs us, that whoever had a mind to be initiated in the myſteries of Cybele were obliged to prepare themſelves by faſting ten days; and, in ſhort, all the pagan deities, whether male or female, required this duty of thoſe that deſired to be initiated into their myſteries, of their prieſts and prieſteſſes that gave the oracles, and of thoſe that came to conſult them.

Among the heathens faſting was alſo practiſed before ſome of their military enterpriſes. Ariſtotle informs us, that the Lacedemonians having reſolved to ſuccour a city of the allies, ordained a faſt throughout the whole extent of their dominions, without excepting even the domeſtic animals: and this they did for two ends; one to ſpare proviſions in favour of the beſieged; the other, to draw down the bleſſing of heaven upon their enterpriſe. The inhabitants of Tarentum, when beſieged by the Romans, demanded ſuccours from their neighbours of Rhegium, who immediately commanded a faſt throughout their whole territories. Their enterpriſe having had good ſucceſs by their throwing a ſupply of proviſions into the town, the Romans were obliged to raiſe the ſiege; and the Tarentines, in memory of this deliverance, inſtituted a perpetual faſt.

Faſting has always been reckoned a particular duty among philoſophers and religious people, ſome of whom have carried their abſtinence to an incredible length. At Rome it was practiſed by kings and emperors themſelves. Numa Pompilius, Julius Ceſar, Auguſtus, Veſpaſian, and others, we are told, had their ſtated faſt-days: and Julian the apoſtate was ſo exact in this obvance as to outdo the prieſts themſelves, and even the moſt rigid philoſophers. The Pythagoreans kept a continual lent; but with this difference, that they believed the uſe of fiſh to be equally unlawful with that of fleſh. Beſides their conſtant temperance, they alſo frequently faſted rigidly for a very long time. In this reſpect, however, they were all outdone by their maſter Pythagoras, who continued his faſts for no leſs than 40 days together. Even Apollonius Tyaneus. one of his moſt famous diſciples, could never come up to him in the length of his faſts, though they greatly exceeded thoſe of the ordinary Pythagoreans. The gymnoſophiſts, or brachmans of the eaſt, are alſo very remarkable for their ſevere faſtings; and the Chineſe, according to father le Comte, have alſo their ſtated faſts, with forms of prayer for preſerving them from barrenneſs, inundations, earthquakes, &c. The Mahometans too, who poſſeſs ſo large a part of Aſia, are very remarkable for the ſtrict obſervance of their faſts; and the exactneſs of their derviſes in this reſpect is extraordinary.

Faſting was often uſed by the heathens for ſuperſtitious purpoſes; ſometimes to procure the interpretations of dreams; at others, to be an antidote againſt their pernicious conſequences. A piece of ſuperſtition prevails to this day among the Jews; who, tho' expreſsly forbid to faſt on Sabbath-days, think themſelves at liberty to diſpenſe with this duty when they happen to have frightful and unlucky dreams the night preceding, that threatened them with great misfortunes. On theſe occaſions they obſerve a formal faſt the whole day; and at night the patient, having invited three of his friends, addreſſes himſelf to them ſeven times in a very ſolemn manner, ſaying, "May the dream I have had prove a lucky one!" And his friends anſwer as many times, "Amen, may it be lucky, and God make it ſo!" After which, in order to encourage him, they conclude the ceremony with theſe words of Eccleſiaſtes, "Go eat thy bread with joy;" and then ſet themſelves down to table. They have alſo added ſeveral faſts not commanded in the law of Moſes, particularly three, in memory of ſore diſtreſſes their nation has ſuffered at different times; and ſome among them have kept an anniverſary faſt in memory of the tranſlation of the Septuagint, in order to expiate the baſe compliance of their doctors for a foreign prince, and the outrage offered to the dignity of their law, which in their opinion was only given to the Jewiſh nation. The abſtinence of the ancient Jews commonly laſted 27 or 28 hours at a time; beginning before ſunſet, and not ending till ſome hours after ſunſet next day. On theſe days they were obliged to wear white robes in token of grief and repentance; to cover themſelves with ſackcloth, or their worſt cloaths; to lie on aſhes; to ſprinkle them on their head, &c. Some ſpent the whole night and day following in the temple or ſynagogue, in prayers and other devotions, barefooted, with a ſcourge in their hands, of which they ſometimes made a good uſe in order to raiſe their zeal. Laſtly, in order to complete their abſtinence, at night they were to eat nothing but a little bread dipped in water with ſome ſalt for ſeaſoning; except they choſe to add to their repaſt ſome bitter herbs and pulſe.

The ancients, both Jews and Pagans, had alſo their faſts for purifying the body, particularly the prieſts and ſuch as were any way employed at the altars; for when nocturnal diſorders happened to theſe, it was unlawful for them to approach all the next day, which they were bound to employ in purifying themſelves. On this account, at great feſtivals, where their miniſtry could not be diſpenſed with, it was uſual for them, on the eve thereof, not only to faſt, but alſo to abſtain from ſleep, for the greater certainty. For this purpoſe the high-prieſt had under-officers to wake him, if overtaken with ſleep; againſt which other preſervatives were alſo made uſe of.

Many wonderful ſtories have been told of extraordinary faſts kept by religious people; great numbers of which, undoubtedly, muſt be falſe. Others, however, we have on very good authority, of which ſome are mentioned under the article ABSTINENCE. Another we have in the

FASTING *Woman*. Of the many inſtances of extraordinary faſting mentioned by different authors, this ſeems to be one of the beſt authenticated. A full account of this very uncommon caſe is given in the Phil. Tranſ. Vol. LXVII. Part I. the ſubſtance of which follows. The woman, whoſe name was *Janet M'Leod*, an inhabitant in the pariſh of Kincardine in Roſsſhire, continued healthy till ſhe was 15 years of age, when ſhe had a pretty ſevere epileptic fit; after this ſhe had an interval of health for four years, and then another epileptic fit which continued a whole day and a night. A few days afterwards ſhe was ſeized with a fever, which continued with violence ſeveral weeks, and from which ſhe did not perfectly recover for ſome months. At this time ſhe loſt the uſe of her eyelids; ſo that ſhe was under a neceſſity of keeping them open with the fingers of one hand, whenever ſhe wanted to look about her. In other reſpects ſhe continued in pretty good health; only ſhe never had any appearance of menſes, but periodically ſpit up blood in pretty large quantities, and at the ſame time it flowed from the noſe. This diſcharge continued ſeveral years; but at laſt it ceaſed; and ſoon after ſhe had a third epileptic fit, and after that a fever from which ſhe recovered very ſlowly. Six weeks after the criſis, ſhe ſtole out of the houſe unknown to her parents, who were buſied in their harveſt-work, and bound the ſheaves of a ridge before ſhe was obſerved. In the evening ſhe took to her bed, complaining much of her *heart*, (moſt probably her *ſtomach*, according to the phraſeology of that country) and her head. From that time ſhe never roſe for five years, but was occaſionally lifted out of bed. She ſeldom ſpoke a word, and took ſo little food that it ſeemed ſcarce ſufficient to ſupport a ſucking infant. Even this ſmall quantity was taken by compulſion; and at laſt, about Whitſunday 1763, ſhe totally refuſed every kind of food or drink. Her jaw now became ſo faſt locked, that it was with the greateſt difficulty her father was able to open her teeth a little, in order to admit a ſmall quantity of gruel or whey; but of this ſo much generally run out at the corners of her mouth, that they could not be ſenſible any had been ſwallowed. About this time they got ſome water from a noted medicinal ſpring in Brae-Mar, ſome of which they attempted to make her ſwallow, but without effect. They continued their trials, however, for three mornings; rubbing her throat with the water, which run out at the corners of her mouth. On the third morning during the operation, ſhe cried out "Give me more water;" and ſwallowed with eaſe all that remained in the bottle. She ſpoke no more intelligibly for a year; though ſhe continued to mutter ſome words which her parents only underſtood, for 14 days. She continued to reject all kinds of food and drink till July 1765. At this time her ſiſter thought, by ſome ſigns ſhe made, that ſhe wanted her jaws opened; and this being done, not without violence, ſhe called intelligibly for a drink, and drank with eaſe about an Engliſh pint of water. Her father then aſked her why ſhe would not make ſome ſigns when ſhe wanted a drink; to which ſhe anſwered, why ſhould ſhe, when ſhe had no deſire. It was now ſuppoſed that ſhe had regained the faculty of ſpeech; and her jaws were kept open for about three weeks, by means of a wedge. But in four or five days ſhe became totally ſilent, and the wedge was removed becauſe it made her lips ſore. She ſtill, however, continued ſenſible; and when her eyelids were opened, knew every body, as could be gueſſed from the ſigns ſhe made.

By continuing their attempts to force open her jaws, two of the under foreteeth were driven out; and of this opening her parents endeavoured to avail themſelves by putting ſome thin nouriſhing drink into her mouth; but without effect, as it always returned by the corners. Sometimes they thought of thruſting a little dough of oatmeal through this gap of the teeth, which ſhe would retain a few ſeconds, and then return with ſomething like a ſtraining to vomit, without one particle going down. Nor were the family ſenſible of any thing like ſwallowing for four years, excepting the ſmall draught of Brae-Mar water, and the Engliſh pint of common water. For the laſt three years ſhe had not any evacuation by ſtool or urine, except that once or twice a-week ſhe paſſed a few drops of urine, about as much, to uſe the expreſſion of her parents, as would wet the ſurface of a halfpenny. In this ſituation ſhe was viſited by Dr Mackenzie, who communicated the account of her caſe to the royal ſociety. He found her not at all emaciated; her knees were bent, and the hamſtrings tight, ſo that her heels almoſt touched her buttocks. She ſlept much, and was very quiet; but when awake, kept a conſtant whimpering like a new-born weakly infant. She never could remain a moment on her back, but always fell to one ſide or another; and her chin was clapped cloſe to her breaſt, nor could it by any force be moved backwards.

The doctor paid his firſt viſit in the month of October; and five years afterwards, viz. in October 1772, was induced to pay her a ſecond viſit, by hearing that ſhe was recovering, and had begun to eat and drink. The account given him was moſt extraordinary. Her parents one day returning from their country-labours (having left their daughter fixed to her bed as uſual), were greatly ſurpriſed to find her ſitting upon her hams, on the ſide of the houſe oppoſite to her bed-place, ſpinning with her mother's diſtaff. All the food ſhe took at that time was only to crumble a little oat or barley cake in the palm of her hand, as if to feed a chicken. She put little crumbs of this into the gap of her teeth; rolled them about for ſome time in her mouth; and then ſucked out of the palm of her hand a little water, whey, or milk; and this only once or twice a-day, and even that by compulſion. She never attempted to ſpeak; her jaws were faſt locked, and her eyes ſhut. On opening her eye-lids, the balls were found to be turned up under the edge of the os frontis; her countenance was ghaſtly, her complexion pale, and her whole perſon emaciated. She ſeemed ſenſible and tractable in every thing except in taking food. This ſhe did with the utmoſt reluctance, and even cried before ſhe yielded; and at laſt only took a few crumbs as if to feed a bird, and ſucked half a ſpoonful of milk from the palm of her hand. The great change of her looks, Doctor Mackenzie attributed to her ſpinning flax on the diſtaff, which exhauſted too much of the ſaliva; and therefore he recommended to her parents to confine her totally to the ſpinning of wool.—In 1775 ſhe was viſited again, and found to be greatly improved in her looks, as well as ſtrength; her food was alſo conſiderably increaſed in quantity, though even then ſhe did not take more than would be ſufficient to ſuſtain an infant of two years of age.

FASTI, in Roman antiquity, the kalendar wherein were expreſſed the ſeveral days of the year, with their feaſts, games, and other ceremonies.

There were two ſorts of faſti, the greater and leſs; the former being diſtinguiſhed by the appellation *faſti magiſtrales*, and the latter by that of *faſti calendares*.

The greater faſti contained the feaſts, with every thing relating to religion and the magiſtrates.

The leſſer were again diſtinguiſhed into the city and country faſti, each adapted to the people for whom they were deſigned. In all theſe faſti, the court-days, or thoſe whereon cauſes might be heard and determined, were marked with the letter F; theſe days were called *faſti*, from *fari*, to ſpeak or pronounce; and the other days, not marked with this letter, were called *nefaſti*.

FASTOLF (Sir John), a valiant and renowned Engliſh officer, a knight-banneret and of the garter, who ſerved in France under Henry IV. V. and VI. was deſcended from an ancient family in Norfolk, and was born about the year 1377. He was as much diſtinguiſhed for his virtue at home, as for his valour abroad; and became no leſs amiable in his private, than he had been admirable in his public character. He died in 1459, upwards of 80 years of age, as we learn from his noted cotemporary William Caxton the firſt Engliſh printer. By an unaccountable miſtake it has been aſſerted, that Shakeſpear's Falſtaff was drawn to ridicule this great man; and this has made judicious biographers more ſtudious to preſerve his reputation.

FAT, in anatomy, an oily concrete ſubſtance depoſited in different parts of animal bodies *.

Strong exerciſe, preternatural heat, an acrimonious ſtate of the juices, and other like cauſes, by which the oily parts of the blood are attenuated, reſolved, or evacuated, prevent the generation of fat: labours of the mind alſo have this effect, as well as labour or intemperature of the body. Hence reſt and plentiful food are ſufficient to fatten brutes; but with men it is often otherwiſe. It is ſurpriſing how ſoon ſome birds grow fat; ortolans in 24 hours, and larks ſtill ſooner.

Fats may be divided, from their conſiſtence, into three kinds: (1.) The ſoft and thin, which grow perfectly liquid in a very ſmall heat. (2.) The thick and conſiſtent, which liquify leſs readily; and, (3.) The hard and firm, which require a ſtill ſtronger heat to melt them. The firſt is called *Pinguedo;* the ſecond, *Auxungia;* and the third, *Adeps*, as taken from the animal; and *Sebum*, or *Sevum*, when freed from the ſkins, &c. This uſe of the names, however, is not conſtant, ſome employing them differently.

A great number of fats have been kept in the ſhops, for making ointments, plaſters, and other medicinal compoſitions; as hogs-lard, the fat of the boar, the fox, the hare, dog, wild cat, Alpine mouſe, beaver; that of hens, ducks, geeſe, ſtorks; of the whale, pike, ſerpents, viper, &c. as alſo human fat.—In regard to all theſe kind of ſubſtances, however, much depends upon the manner of purifying or trying, and of keeping them.

To obtain fat pure, it muſt be cut into pieces, and cleaned from the interpoſed membranes and veſſels. It muſt then be cleanſed from its gelatinous matter by waſhing with water, till the water comes from it colourleſs and inſipid; it is afterwards to be melted with a moderate heat in a proper veſſel with a little water; and it is to be kept thus melted till the water be entirely evaporated, which is known by the diſcontinuance of the boiling, which is cauſed by the water only, and which laſts till not a drop of it remains: it is afterwards to be put into an earthen pot, where it fixes; then it is exceedingly white, ſufficiently pure for the purpoſes of pharmacy or chemical examination.

Fat thus purified has very little taſte, and a weak, but peculiar, ſmell.

Mineral acids exhibit the ſame phenomena with fat, as they do with the fixed ſweet oils of vegetables, which contain nothing gummy or reſinous, and which do not dry. Such is the oil of ben, oil of olives, and all thoſe which chemiſts call *fat oils*.

Alkalis diſſolve fat, as they do theſe oils, and form a ſimilar ſoap. Fat contains no principle ſo volatile as to be raiſed with the heat of boiling water. It does not inflame, but when heated in open air ſo as to riſe in vapours. Laſtly, by age it contracts an acrid and rancid quality.

When fat is diſtilled with a heat ſuperior to that of boiling water, which muſt therefore be done in a retort and in a naked fire, firſt an acid phlegm ariſes, and a ſmall portion of oil which remains fluid. As the diſtillation continues, the acid becomes ſtronger, and the oil thicker, and at laſt it congeals in the receiver. No other principle ariſes during this diſtillation: and, laſtly, when the retort is red, nothing remains but a very ſmall quantity of that kind of coal which cannot be burnt without very great difficulty. See Coal.

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* See Anatomy, n° 82.

If the congealed oil which is found in the receiver be again diſtilled, more acid is obtained, and an oil which does not congeal; and thus, by repeating the diſtillations, the oil is more and more attenuated. While it is thus deprived of its acid, it acquires a more and more penetrating ſmell; and thus, by diſtillation alone, it may be rendered as volatile as eſſential oils, and capable of riſing with the heat of boiling water.

Fat, and all other analogous oily matters, cannot be heated ſufficiently to be raiſed into vapours, without ſuffering a conſiderable alteration, and even decompoſition. The vapours which riſe from it, when heated in open air, are the ſame as thoſe which riſe when diſtilled in cloſe veſſels. They conſiſt of acid and attenuated oil. This acid is remarkably penetrating, acrid, and volatile; it irritates and inflames the eyes, the throat, and lungs; it makes the eyes ſhed tears, and excites a cough as much as volatile ſulphureous acid does, although its nature be very different.

When fat is in its natural ſtate, and has not yet ſuffered any alteration, its acid is ſo well combined with its oily part, that none of its properties can be perceived. Thus fat, in good condition, is very mild, and uſed ſucceſsfully in medicine, particularly externally, for its lenient quality: but, notwithſtanding its great mildneſs, before it has been heated ſufficiently to decompoſe it, and while it is yet freſh, it becomes exceedingly acrid, irritating, and cauſtic, when its acid is partly diſengaged by fire or by time.

When fat is become very rancid, not only its medicinal effects, but alſo many of its eſſential properties, are totally changed, particularly its property of reſiſting the action of ſpirit of wine: for this menſtruum, which does not affect pure and unchanged fat, diſſolves ſome portion of fat which has been ſtrongly heated, or which has become rancid. This effect can certainly proceed from no other cauſe, than that the acid of the fat diſengages itſelf in both theſe caſes. Mr de Machy, an intelligent apothecary of Paris, and an able chemiſt and obſerver, has made a remark upon this ſubject which correſponds with this opinion; which is, that all the rancidity of fat may be taken from it by treating it with ſpirit of wine. Now, this evidently happens, becauſe the ſpirit of wine diſſolves all the portion of fat which is diſengaged from its acid; that is, all the rancid part, while it does not touch that which is not changed. This practice may be advantageouſly employed for the preſervation or recovery of ſome fats uſed in medicine, but which are rare, and not to be procured in their recent ſtate.

One of the chief uſes of fat probably is, to receive into its compoſition, to blunt and correct, a great part of the acids of the aliments, and which are more than are requiſite to the compoſition of the nutritive juice, or which nature could not otherwiſe expel. This is certain, that the greater the quantity of aliments is taken by healthy animals above what is neceſſary for their nouriſhment and reproduction, the fatter they become. Hence animals which are caſtrated, which are not much exerciſed, or which are come to an age when the loſs and production of the ſeminal fluid is leſs, and which at the ſame time conſume much ſucculent aliment, generally become fatter, and ſometimes exceedingly ſo.

Although fat be very different from truly animaliſed ſubſtances, and appears not eaſily convertible into nutritive juices, it being generally difficult of digeſtion, and apt to become rancid, as butter does in the ſtomachs of many perſons; yet in certain caſes it ſerves to the nouriſhment and reparation of the body. Animals certainly become lean, and live upon their fat, when they have too little food, and when they have diſeaſes which prevent digeſtion and the production of the nutritive juice; and in theſe caſes the fatter animals hold out longer than the leaner. The fat appears to be then abſorbed by the veſſels deſigned for this uſe, and to be transformed into nutritive juice.

Fat, in the ſea-language, ſignifies the ſame with broad. Thus a ſhip is ſaid to have a fat quarter, if the truſſing-in or tuck of her quarter be deep.

Fat is uſed alſo for ſeveral utenſils; as, 1. A great wooden veſſel, employed for the meaſuring of malt, and containing a quarter or eight buſhels. 2. A large brewing veſſel, uſed by brewers to run their wort in. 3. A leaden pan or veſſel for the making of ſalt at Droitwich.

Fat likewiſe denotes an uncertain meaſure of capacity. Thus a fat of iſingglaſs contains from 3¼ hundred weight to 4 hundred weight; a fat of unbound books, half a maund or four bales; of wire, from 20 to 25 hundred weight; and of yarn, from 220 to 221 bundles.

FATE, *fatum*, denotes an inevitable neceſſity depending upon a ſuperior cauſe. The word is formed *a fando*, from "ſpeaking;" and primarily implies the ſame with *effatum*, viz. a word or decree pronounced by God; or a fixed ſentence whereby the Deity has preſcribed the order of things, and allotted to every perſon what ſhall befal him.

The Greeks called it ειμαρμενη, as it were a chain or neceſſary ſeries of things indiſſolubly linked together. It is alſo uſed to expreſs a certain unavoidable deſignation of things, by which all agents, both neceſſary and voluntary, are ſwayed and directed to their ends See Necessity.

In this laſt ſenſe, fate is diſtinguiſhed into, 1. Aſtrological, ariſing from the influence and poſition of the heavenly bodies; which (it is ſuppoſed) give laws both to the elements and mixed bodies, and to the wills of men. 2. Stoical fate, defined by Cicero an order or ſeries of cauſes, wherein, cauſe being linked to cauſe, each produces another, and thus all things flow from one prime cauſe. To this fate the Stoics ſubject even the gods.

Fate is divided by later authors into phyſical and divine. 1. Phyſical fate is an order and ſeries of natural cauſes appropriated to their effects. By this fate it is that fire warms, bodies communicate motion to each other, &c. and the effects of it are all the events and phenomena of nature. See Nature. 2. Divine fate is what is more uſually called *Providence*. See Providence.

FATES, in mythology. See Parcæ.

FATHEMITES, Fatemites, or Fathimites, the deſcendants of Mahomet by Fathema, or Fatima, his daughter. They never enjoyed the khalifat of Mecca or Bagdad, but reigned in Barbary and Egypt. See the hiſtory of theſe countries.

FATHER, a term of relation denoting a perſon who hath begot a child. See Parent and Child.

By the laws of Romulus, a father had an unlimited power over his children. Amongſt the Lacedemonians, as we learn from Ariſtotle's politics, the father of three children was excuſed from the duty of mounting guard for the ſecurity of the city; and a father of four children, was exempted from every public burden. The Poppæan law amongſt the Romans, granted many valuable privileges to the fathers of three children; amongſt which one was, that he ſhould be excuſed from civil offices, and that the mother ſhould have liberty, in her father's life-time, to make a will, and manage her eſtate without the authority of tutors.

Natural Father, is he who has illegitimate children. See Bastard; and Law, N° clxi. 33. clxxxii. 3, 4.

Father, in theology, is uſed in ſpeaking of the Firſt Perſon of the Trinity.

Father, is alſo uſed in ſpeaking of ſpiritual and moral things. Thus, Abraham is called the "*father* of the faithful."

Father, in church-hiſtory, is applied to ancient authors who have preſerved in their writings the traditions of the church. Thus St Chryſoſtom, St Baſil, &c. are called *Greek fathers*, and St Auguſtine and St Ambroſe *Latin fathers*. No author who wrote later than the 12th century is dignified with the title of *Father*.

Father, is alſo a title of honour given to prelates and dignitaries of the church, to the ſuperiors of convents, to congregations of eccleſiaſtics, and to perſons venerable for their age or quality. Thus we ſay, the right reverend father in God, the father-general of the Benedictines, the fathers of the council of Nice, father of his country, &c.

FATHERLASHER, in ichthyology. See Cottus.

FATHOM, a long meaſure containing ſix feet, uſed chiefly at ſea for meaſuring the length of cables and cordage.

FATNESS. See Corpulency.—It is obſerved, that for one fat perſon in France or Spain, there are an hundred in England and Holland. This is ſuppoſed to be from the uſe of new malt liquors, more than from the difference of climates or degrees of perſpiration. Indolence may cauſe fatneſs in ſome few conſtitutions; but, in general, thoſe who are diſpoſed to this habit will be fat in ſpite of every endeavour to the contrary, but that of deſtroying health.

FATUARII, in antiquity, were perſons, who, appearing inſpired, foretold things to come. The word is formed of *Fatua*, wife of the god Faunus, who was ſuppoſed to inſpire women with the knowledge of futurity, as Faunus himſelf did the men.—Fatua had her name from *fari*, q. d. *vaticinari*, "to propheſy."

FATUUS ignis, in phyſiology, a meteor otherwiſe called Will-*with-a-wiſp*. See that article.

FAVISSÆ, in antiquity, were, according to Feſtus and Gellius, ciſterns to keep water in: but the faviſſæ in the Capitol at Rome were dry ciſterns or ſubterraneous cellars, where they laid up the old ſtatues, broken veſſels, and other things uſed in the temple. Theſe were much the ſame with what, in ſome of the modern churches, are called the *archives* and *treaſury*.

FAUNALIA, in Roman antiquity, three annual feſtivals in honour of the god Faunus; the firſt of which was obſerved on the ides of February, the ſecond on the 16th of the calends of March, and the third on the nones of December. The principal ſacrifices on this occaſion were lambs and kids. Faunus was a deity of the Romans only, being wholly unknown to the Greeks.

FAUNS, a kind of rural deities, among the ancient Romans. See Faunus.

FAUNUS, in fabulous hiſtory, was king of the Aborigines, or country of the Latins, and ſucceeded his father Picus, about 1220 B. C. He is ſaid to have inſtituted a great number of religious ceremonies, and to have kept himſelf almoſt always concealed, on which account he was confounded with the god Pan. His children called *Fauni*, or *Fauns*, were viſionary beings, much like the ſatyrs, and were uſually crowned with pine; but both Faunus and they were only worſhipped in Italy, and were wholly unknown to the Greeks.

FAVORINUS, an ancient orator and philoſopher of Gaul, who flouriſhed under the emperor Adrian, and taught with high reputation both at Athens and Rome. Many works are attributed to him; among the reſt, a Greek miſcellaneous hiſtory often quoted by Diogenes Laertius.

FAUSTUS. See Fuſt.

FAWN, among ſportſmen, a buck or doe of the firſt year; or the young one of the buck's breed in its firſt year.

FE, fo, or *Fohi*, the name of the chief god of the Chineſe, whom they adore as the ſovereign of heaven. They repreſent him ſhining all in light, with his hands hid under his robes, to ſhew that his power does all things inviſibly. He has at his right-hand the famous Confucius, and at his left Lanza or Lanca, chief of the ſecond ſect of their religion.

FEALTY, in law, an oath taken on the admittance of any tenant, to be true to the lord of whom he holds his land: by this oath the tenant holds in the freeſt manner, on account that all who have fee hold *per fidem et fiduciam*, that is, by fealty at the leaſt.

This fealty, at the firſt creation of it, bound the tenant to fidelity, the breach of which was the loſs of his fee. It has been divided into general and ſpecial: general, that which is to be performed by every ſubject to his prince; and ſpecial, required only of ſuch as, in reſpect of their fee, are tied by oath to their lords. To all manner of tenures, except tenancy at will, and frank-almoign, fealty is incident, though it chiefly belongs to copyhold eſtates held in fee and for life. The form of this oath by ſtat. 17 Edw. II. is to run as follows. "I A. B. will be to you my lord D. true and faithful, and bear to you faith for the lands and tenements which I hold of you; and I will truely do and perform the cuſtoms and ſervices that I ought to do to you. So help me God."

FEAR, one of the paſſions of the human mind. See Paſſion.

Fear (*Metus*, *Pavor*, or *Timor*), was deified by the Pagans. Tullus Hoſtilius brought the worſhip of this deity to Rome. The Ephori of Sparta erected a temple to Fear, near their tribunal, to ſtrike an awe into thoſe who approached it. Fear was likewiſe worſhipped at Corinth. The poets did not forget this imaginary deity. Virgil places her in the entrance of hell, in company with diſeaſes, old age, &c. *Æn.* vi. 273.—Ovid places her in the retinue of Tiſiphone one of the furies, *Met.* iv. 483.

FEAST, or Festival, in a religious ſenſe, is a day of feaſting and thankſgiving.

Among the ancients, feaſts were inſtituted upon various accounts, but eſpecially in memory of ſome favourable interpoſition of Providence. Thus, the Jews had their feaſt of paſſover, pentecoſt, and tabernacles; the Greeks their cerealia, panathenæa, &c. and the Romans their ſaturnalia, ambarvalia, &c. See Passover, Cerealia, &c.

In the ancient Chriſtian church, beſides the high feſtivals of Chriſtmas, Eaſter, Pentecoſt, Annunciation, &c. there were others inſtituted in honour of the apoſtles and martyrs: all which are retained by the church of England. See the articles Christmas, Easter, &c. In the church of Rome, there are double, half-double, and ſimple feaſts almoſt without number. The name of *double feaſts* is given to ſuch whoſe ſervice is fuller and more ſolemn than the reſt, which likewiſe conſtitutes the difference between the others; the churches being embelliſhed, and the altars adorned, according to the rank which each ſaint holds in his reſpective church. All high feſtivals have an octave, conſiſting of the feaſt itſelf, and the ſeven following days.

In Italy, certain feſtivals are celebrated ſolely by lovers. When a lover wants to give his miſtreſs the higheſt teſtimony of his gallantry, he immediately makes her the idol of his devotion; procuring veſpers, and even maſſes, to be ſaid to her honour. For this purpoſe he makes choice of the feſtival of ſome ſaint whoſe name ſhe bears; and though the ſaint has the ſame name, they manage matters ſo, that the devotion of the feſtival is plainly relative to the lover's miſtreſs.

The four quarterly feaſts, or ſtated times, whereon rent on leaſes is uſually reſerved to be paid, are Lady-day, or the annunciation of the bleſſed virgin Mary, or 25th of March; the nativity of St John the Baptiſt, held on the 24th of June; the feaſt of St Michael the arch-angel, on the 29th of September; and Chriſtmas, or rather of St Thomas the apoſtle, on the 21ſt of December. See Annunciation, &c.

FEATHER, in phyſiology, a general name for the covering of birds; it being common to all the animals of this claſs to have their whole body, or at leaſt the greateſt part of it, covered with feathers or plumage.

Feathers make a conſiderable article of commerce. Thoſe from Somerſetſhire are eſteemed the beſt, and thoſe from Ireland the worſt.—Eider-down is imported from Denmark, the ducks that ſupply it being inhabitants of Hudſon's bay, Greenland, Ireland, and Norway. Our own Iſlands weſt of Scotland breed numbers of theſe birds, and might turn out a profitable branch of trade to the poor inhabitants. Hudſon's bay alſo furniſhes very fine feathers, ſuppoſed to be of the gooſe-kind. The down of the ſwan is brought from Dantzic. The ſame place alſo ſends us great quantities of the feathers of the cock and hen. The London poulterers ſell a great quantity of the feathers of thoſe birds, and of ducks and turkies: thoſe of ducks being a weaker feather, are inferior to thoſe of the gooſe; and turkies feathers are the worſt of any. The beſt method of curing feathers is to lay them in a room, in an expoſure to the ſun; and when dried, to put them in bags, and beat them well with poles to get the dirt off.

FEBRIFUGE, an appellation given to ſuch medicines as mitigate or remove a fever.

FEBRUARY, in chronology, the ſecond month of the year, reckoning from January, firſt added to the calendar of Romulus by Numa Pompilius.

February derives its name from *Februa*, a feaſt held by the Romans in this month, in behalf of the manes of the deceaſed; at which ceremony ſacrifices were performed, and the laſt offices were paid to the ſhades of the defunct.

February, in a common year, conſiſts only of 28 days; but in the biſſextile year, it has 29, on account of the intercalary day added that year.

FECIALES, or Foeciales, a college of prieſts inſtituted at Rome by Numa, conſiſting of 20 perſons, ſelected out of the beſt families. Their buſineſs was to be arbitrators of all matters relating to war and peace, and to be the guardians of the public faith. It is probable that they were ranked among the officers of religion, to procure them the more deference and authority, and to render their perſons more ſacred among the people. If the commonwealth had received any injury from a foreign ſtate, they immediately diſpatched theſe officers to demand ſatisfaction, who, if they could not procure it, were to atteſt the gods againſt that people and country, and to denounce war: otherwiſe they confirmed the alliance, or contracted a new one, which they ratified by ſacrificing a hog.

FECUNDITY, the ſame with Fertility.

FEE, in law, ſignifies a complete feudal property. Hence, where the bare liferent of any feudal ſubject is meant to be conveyed to A, and the abſolute property to B, that meaning is expreſſed thus; "to A in liferent, and to B in fee." See Law, N° lxix. clxiv.

Fees are commonly divided into *abſolute*, otherwiſe called fees-ſimple; and *limited*, one ſpecies of which we uſually call fee-tail.

Blackſt. Comment.

I. Tenant in fee-ſimple (or, as he is frequently ſtiled, *tenant in fee)* is that he hath lands, tenements, or hereditaments, to hold to him and his heirs for ever; generally, abſolutely, and ſimply; without mentioning what heirs, but referring that to his own pleaſure, or to the diſpoſition of the law. The true meaning of the word fee *(feodum)* is the ſame with that of *feud* or *fief*, * and in its original ſenſe it is taken in contradiſtinction to *allodium*; which latter the writers on this ſubject define to be every man's own land, which he poſſeſſeth merely in his own right, without owing any rent or ſervice to any ſuperior. This is property in its higheſt degree; and the owner thereof hath *abſolutum et directum dominium*, and therefore is ſaid to be ſeiſed thereof abſolutely *in dominico ſuo*, in his own demeſne. But *feodum*, or *fee*, is that which is held of ſome ſuperior, on condition of rendering him ſervice; in which ſuperior the ultimate property of the land reſides. And therefore Sir Henry Spelman defines a feud or fee to be, The right which the vaſſal or tenant hath in lands to uſe the ſame, and take the profits thereof to him

* See *Feodal* Syſtem.

and his heirs, rendering to the lord his due ſervices; the mere allodial propriety of the ſoil always remaining in the lord. This allodial property no ſubject in Britain has; it being a received and now undeniable principle in the law, that all the lands are holden mediately or immediately of the king. The king therefore only hath *abſolutum et directum dominium*; but all ſubjects lands are in the nature of *feodum* or *fee*, whether derived to them by deſcent from their anceſtors, or purchaſed for a valuable conſideration: for they cannot come to any man by either of thoſe ways, unleſs accompanied with thoſe feodal clogs which were laid upon the firſt feudatory when it was originally granted. A ſubject therefore hath only the uſufruct, and not the abſolute property, of the ſoil; or, as Sir Edward Coke expreſſes it, he hath *dominium utile*, but not *dominium directum*. And hence it is that, in the moſt ſolemn acts of law, we expreſs the ſtrongeſt and higheſt eſtate that any ſubject can have, by theſe words, "he is ſeiſed thereof *in his demeſne*, as of fee." It is a man's demeſne, *dominicum*, or property, ſince it belongs to him and his heirs for ever: yet this *dominicum*, property, or demeſne, is ſtrictly not abſolute or allodial, but qualified or feodal: it is in his demeſne, *as of fee*; that is, it is not purely and ſimply his own, ſince it is held of a ſuperior lord, in whom the ultimate property reſides.

This is the primary ſenſe and acceptation of the word *fee*. But (as Sir Martin Wright very juſtly obſerves) the doctrine, "that all lands are *holden*," having been for ſo many ages a fixed and undeniable axiom, the Engliſh lawyers do very rarely (of late years eſpecially) uſe the word *fee* in this its primary original ſenſe, in contradiſtinction to *allodium* or abſolute property, with which they have no concern; but generally uſe it to expreſs the continuance or quantity of eſtate. A *fee* therefore, in general, ſignifies an eſtate of inheritance; being the higheſt and moſt extenſive intereſt that a man can have in a feud: and, when the term is uſed ſimply, without any other adjunct, or has the adjunct of *ſimple* annexed to it, (as, a fee, or a fee-ſimple) it is uſed in contradiſtinction to a fee conditional at the common law, or a fee-tail by the ſtatute; importing an abſolute inheritance, clear of any condition, limitation, or reſtrictions to particular heirs, but deſcendible to the heirs-general, whether male or female, lineal or collateral. And in no other ſenſe than this is the king ſaid to be ſeiſed in fee, he being the feudatory of no man.

Taking therefore *fee* in this its ſecondary ſenſe, as a ſtate of inheritance, it is applicable to, and may be had in, any kind of hereditaments either corporeal or incorporeal. But there is this diſtinction between the two ſpecies of hereditaments; that, of a corporeal inheritance a man ſhall be ſaid to be ſeiſed *in his demeſne, as of fee*; of an incorporeal one he ſhall only be ſaid to be ſeiſed *as of fee*, and not *in his demeſne*. For, as incorporeal hereditaments are in their nature collateral to, and iſſue out of, lands and houſes, their owner hath no property, *dominicum*, or demeſne, in the *thing* itſelf, but hath only ſomething derived out of it; reſembling the *ſervitutes*, or ſervices, of the civil law. The *dominicum*, or property, is frequently in one man, while the appendage or ſervice is in another. Thus Gaius may be ſeiſed *as of fee*, of a way going over the land, of which Titius is ſeiſed *in his demeſne as of fee*.

The fee-ſimple or inheritance of lands and tenements is generally veſted and reſides in ſome perſon or other; though divers inferior eſtates may be carved out of it. As if one grants a leaſe for 21 years, or for one or two lives, the fee-ſimple remains veſted in him and his heirs; and after the determination of thoſe years or lives, the land reverts to the grantor or his heirs, who ſhall hold it again in fee-ſimple. Yet ſometimes the fee may be in *abeyance*, that is (as the word ſignifies) in expectation, remembrance, and contemplation in law; there being no perſon *in eſſe*, in whom it can veſt and abide: though the law conſiders it as always potentially exiſting, and ready to veſt whenever a proper owner appears. Thus, in a grant to John for life, and afterwards to the heirs of Richard, the inheritance is plainly neither granted to John nor Richard, nor can it veſt in the heirs of Richard till his death, *nam nemo eſt hæres viventis*: it remains therefore in waiting, or abeyance, during the life of Richard. This is likewiſe always the caſe of a parſon of a church, who hath only an eſtate therein for the term of his life; and the inheritance remains in abeyance. And not only the fee, but the freehold alſo, may be in abeyance; as, when a parſon dies, the freehold of his glebe is in abyeance until a ſucceſſor be named, and then it veſts in the ſucceſſor.

The word, *heirs*, is neceſſary in the grant or donation in order to make a fee or inheritance. For if land be given to a man for ever, or to him and his aſſigns for ever, this veſts in him but an eſtate for life. This very great nicety about the inſertion of the word *heirs* in all feoffments and grants, in order to veſt a fee, is plainly a relic of the feodal ſtrictneſs: by which it was required, that the form of the donation ſhould be punctually purſued; or that, as Craig expreſſes it, in in the words of Baldus, "*donationes ſint ſtricti juris*, "*ne quis plus donaſſe præſumatur quam in donatione* "*expreſſerit*." And therefore, as the perſonal abilities of the donee were originally ſuppoſed to be the only inducements to the gift, the donee's eſtate in the land extended only to his own perſon, and ſubſiſted no longer than his life; unleſs the donor, by an expreſs proviſion in the grant, gave it a longer continuance, and extended it alſo to his heirs. But this rule is now ſoftened by many exceptions.

For, 1. It does not extend to deviſes by will; in which, as they were introduced at the time when the feodal rigour was apace wearing out, a more liberal conſtruction is allowed: and therefore by a deviſe to a man for ever, or to one and his aſſigns for ever, or to one in fee-ſimple, the deviſee hath an eſtate of inheritance; for the intention of the deviſor is ſufficiently plain from the words of perpetuity annexed, though he hath omitted the legal words of inheritance. But if the deviſe be to a man and his aſſigns, without annexing words of perpetuity, there the deviſee ſhall take only an eſtate for life; for it does not appear that the deviſor intended any more. 2. Neither does this rule extend to fines or recoveries, conſidered as a ſpecies of conveyance; for thereby an eſtate in fee paſſes by act and operation of law without the word *heirs*: as it does alſo, for particular reaſons, by certain other methods of conveyance, which have relation to a former grant or eſtate, wherein the word *heirs* was expreſſed. 3. In creations of nobility by writ, the peer ſo created hath an inheritance in his title, without expreſſing the word *heirs*; for they are implied in the creation, unleſs it be otherwiſe ſpecially provided: but in creations by patent, which are *ſtricti juris*, the word *heirs* muſt be inſerted, otherwiſe there is no inheritance. 4. In grants of lands to ſole corporations and their ſucceſſors, the word *ſucceſſors* ſupplies the place of *heirs*; for as heirs take from the anceſtor, ſo doth the ſucceſſor from the predeceſſor. Nay, in a grant to a biſhop, or other ſole ſpiritual corporation, in *frankalmoign*; the word *frankalmoign* ſupplies the place of *ſucceſſors* (as the word *ſucceſſors* ſupplies the place of *heirs*) *ex vi termini*; and in all theſe caſes a fee-ſimple veſts in ſuch ſole corporation. But, in a grant of lands to a corporation aggregate, the word *ſucceſſors* is not neceſſary, though uſually inſerted: for, albeit ſuch ſimple grant be ſtrictly only an eſtate for life, yet as that corporation never dies, ſuch eſtate for life is perpetual, or equivalent to a fee-ſimple, and therefore the law allows it to be one. Laſtly, in the caſe of the king, a fee-ſimple will veſt in him, without the word *heirs* or *ſucceſſors* in the grant; partly from prerogative royal, and partly from a reaſon ſimilar to the laſt, Becauſe the king, in judgment of law, never dies. But the general rule is, that the word *heirs* is neceſſary to create an eſtate of inheritance.

II. We are next to conſider limited fees, or ſuch eſtates of inheritance as are clogged and confined with conditions or qualifications of any ſort. And theſe we may divide into two ſorts: 1. *Qualified*, or *baſe* fees; and, 2. Fees *conditional*, ſo called at the common law; and afterwards fees-*tail*, in conſequence of the ſtatute *de donis*.

1. A BASE, or qualified, fee is ſuch a one as has a qualification ſubjoined thereto, and which muſt be determined whenever the qualification annexed to it is at an end. As, in the caſe of a grant to A and his heirs, tenants in the manor of Dale; in this inſtance, whenever the heirs of A ceaſe to be tenants of that manor, the grant is entirely defeated. So, when Henry VI. granted to John Talbot, lord of the manor of Kingſton-Liſle in Berks, that he and his heirs, lords of the ſaid manor, ſhould be peers of the realm, by the title of *barons of Liſle*; here John Talbot had a baſe or qualified fee in that dignity; and the inſtant he or his heirs quitted the ſeignory of this manor, the dignity was at an end. This eſtate is a fee, becauſe by poſſibility it may endure for ever in a man and his heirs; yet as that duration depends upon the concurrence of collateral circumſtances, which qualify and debaſe the purity of the donation, it is therefore a qualified or baſe fee.

2. As to fees-*conditional*, or fees-*tail*, ſee the article TAIL.

FEE alſo ſignifies a certain allowance to phyſicians, barriſters, attornies, and other officers, as a reward for their pains and labour.

If a perſon refuſe to pay an officer his due fees, the court will grant an attachment againſt him, to be committed till the fees are paid; and an attorney may bring an action of the caſe for his fees, againſt the client that retained him in his cauſe.

FEE alſo denotes a ſettle perquiſite of public officers, payable by thoſe who employ them.

The fees due to the officers of the cuſtom-houſe, are expreſsly mentioned in a ſchedule, or table, which is hung up in public view in the ſaid office, and in all other places where the ſaid fees are to be paid or received. And, if any officer ſhall offend, by acting contrary to the regulations therein contained, he ſhall forfeit his office and place, and be for ever after incapable of any office in the cuſtom-houſe.

The other public offices have likewiſe their ſettled fees, for the ſeveral branches of buſineſs tranſacted in them.

FEE-*Farm*, a kind of tenure without homage, fealty, or other ſervice, except that mentioned in the feoffment; which is uſually the full rent, or at leaſt a fourth part of it.

The nature of this tenure is, that if the rent be behind, and unpaid for two years, then the feoffor and his heirs may have an action for the recovery of the lands.

FEELERS, in natural hiſtory, a name uſed by ſome for the horns of INSECTS.

FEELING, one of the five external ſenſes, by which we obtain the ideas of ſolid, hard, ſoft, rough, hot, cold, wet, dry, and other tangible qualities. See ANATOMY, n° 408.

FEET. See FOOT.

FEET, in Poetry. See POETRY, n° 117, 175.

FEINT, in fencing, a ſhew of making a thruſt at one part, in order to deceive the enemy, that you may really ſtrike him in another.

A ſimple feint is a mere motion of the wriſt, without ſtirring the foot.

FELAPTON, in logic, one of the ſix firſt modes of the third figure of ſyllogiſms; whereof the firſt propoſition is an univerſal negative, the ſecond an univerſal affirmative, and the third a particular negative.

FELIBIEN (Andre), was born at Chartres in 1619, and went ſecretary under the marquis de Fontenay Mareuil ambaſſador to the court of Rome in 1647. On his return, M. Colbert procured him the places of hiſtoriagrapher to the king, ſuperintendent of his buildings, and of the arts and manufactures in France. He became afterwards deputy comptroller-general of the bridges and dykes in that kingdom; and died in 1695. He wrote ſeveral pieces relating to the fine arts, the principal of which is his "Dialogues on the lives and works of the moſt eminent painters."

FELICITAS, (FELICITY, or *Happineſs*,) was deified by the ancient Pagans. Lucullus built a temple to her. She had another erected by Lepidus. The Greeks paid divine worſhip to *Macaria*, daughter of Hercules, the ſame with *Felicitas*. This deity is often pictured upon medals, and generally with a Cornucopia in one hand and a Caducius in the other. The inſcriptions are, *Felicitas Temporum*, *Felicitas Auguſti*, *Felicitas Publica*, &c.

FELIX, proconſul, and governor of Judea in the firſt century, was brother to Pallas the freedman of the emperor Claudius. He arrived in Judæa about the year 53, when he conceived a violent paſſion for Druſilla the daughter of Agrippa and wife of Azizes, and married her. For this reaſon St Paul, on his ſpeaking before him, diſcourſed of chaſtity and the judgment to come with ſuch energy, that Felix trembled. Some time after, Nero recalled him on account of his ill conduct, and ſent Portius Feſtus to ſucceed him.

Felix (Minutius), a father of the primitive church, who flouriſhed about the beginning of the third century. He was an African by birth, and a lawyer by profeſſion; and has written a very elegant dialogue in defence of the Chriſtian religion, intitled *Octavius*, from the name of the principal ſpeaker. This work was long attributed to Arnobius; but was aſcribed to the genuine author by Balduinus, a celebrated lawyer, in his edition of 1560 printed at Heidelberg. The beſt edition of it is that at Cambridge, in 1712, by Dr Davis.

FELIS, the Cat, a genus of quadrupeds belonging to the order of feræ, the characters of which are theſe: The fore-teeth are equal; the molares or grinders have three points; the tongue is furniſhed with rough ſharp prickles, and pointing backwards; and the claws are ſheathed, and retractile. This genus comprehends ſeven genera, *viz*.

Lion.

1. The *Leo*, or Lion. The largeſt lions are from eight to nine feet in length, and from four to ſix feet high: thoſe of a ſmaller ſize are generally about 5½ feet long, and about 3½ high. His head is very thick, and his face is beſet on all ſides with long buſhy yellowiſh hair; this ſhaggy hair extends from the top of the head to below the ſhoulders, and hangs down to his knees: the belly and breaſt are likewiſe covered with long hair. The reſt of the body is covered with very ſhort hair, excepting a buſh at the point of the tail. The ears are roundiſh, ſhort, and almoſt entirely concealed under the hair of his front. The ſhaggineſs of the fore-part of his body makes the hinder part have a naked appearance. The tail is long and very ſtrong; the legs are thick and fleſhy; and the feet are ſhort; the length of the claws is about an inch and a quarter, are of a whitiſh colour, very crooked, and can be extended or retracted into the membranous ſheath at pleaſure: their points are ſeldom blunted, as they are never extended but when he ſeizes his prey.

The female, or lionneſs, has no mane, or long hair about her head or ſhoulders; in her we ſee diſtinctly the whole face, head, ears, neck, ſhoulders, breaſt, &c. all theſe parts being in ſome meaſure concealed under the long hair of the male, give the female a very different appearance: beſides, ſhe is conſiderably leſs than the male. The hair of both male and female is of a yellowiſh colour, and whitiſh on the ſides and belly.

In warm countries, quadrupeds in general are larger and ſtronger than in the cold or temperate climates. They are likewiſe more fierce and hardy; all their natural qualities ſeem to correſpond with the ardour of the climate. The lions nouriſhed under the ſcorching ſun of Africa or the Indies, are the moſt ſtrong, fierce, and terrible. Thoſe of mount Atlas, whoſe top is ſometimes covered with ſnow, are neither ſo ſtrong nor ſo ferocious as thoſe of Biledulgerid or Zaara, whoſe plains are covered with burning ſand. It is in theſe hot and barren deſarts, that the lion is the dread of travellers, and the ſcourge of the neighbouring provinces. But it is a happy circumſtance that the ſpecies is not very numerous: they even appear to diminiſh daily. The Romans, ſays Mr Shaw, brought many more lions out of Libya for their public ſhews, than are now to be found in that country. It is likewiſe remarked, that the lions in Turky, Perſia, and the Indies, are leſs numerous than formerly. As this formidable and courageous animal makes a prey of moſt other animals, and is himſelf a prey to none, this diminution in the number of the ſpecies can be owing to nothing but an increaſe in the number of mankind: for it muſt be acknowledged, that the ſtrength of this king of animals is not a match for the dexterity and addreſs of a negro or Hottentot, who will often dare to attack him face to face, and with very ſlight weapons.

The ingenuity of mankind augments with their number; that of other animals continues always the ſame. All the noxious animals, as the lion, are reduced to a ſmall number, not only becauſe mankind are become more numerous, but likewiſe becauſe they have become more ingenious, and have invented weapons which nothing can reſiſt. This ſuperiority in the numbers and induſtry of mankind, at the ſame time that it has broke the vigour of the lion, ſeems likewiſe to have enervated his courage. This quality, though natural, is exalted or lowered according to the good or bad ſucceſs with which any animal has been accuſtomed to employ his force. In the vaſt deſarts of Zara; in thoſe which ſeem to ſeparate two very different races of men, the Negroes and Moors, between Senegal and the boundaries of Mauritania; in thoſe uninhabited regions above the country of the Hottentots; and, in general, in all the meridional parts of Africa and Aſia, where mankind have diſdained to dwell, lions are ſtill as numerous and as ferocious as ever. Accuſtomed to meaſure their ſtrength by that of all other animals which they encounter, the habit of conquering renders them haughty and intrepid. Having never experienced the ſtrength of man, or the power of his arms, inſtead of diſcovering any ſigns of fear, they diſdain and ſet him at defiance. Wounds irritate, but do not terrify them: they are not even diſconcerted at the ſight of numbers. A ſingle lion of the deſart has been known to attack a whole caravan; and if, after a violent and obſtinate engagement, he found himſelf weakened, he retreats fighting, always keeping his face to the enemy. On the other hand, the lions which live near the villages or huts of the Indians or Africans, being acquainted with man and the force of his arms, are ſo daſtardly as to fly and leave their prey at the ſight of women or children.

This ſoftening in the temper and diſpoſition of the lion, ſhows that he is capable of culture, and ſuſceptible, at leaſt to a certain degree, of the impreſſions that he receives: accordingly, hiſtory informs us of lions yoked in triumphal chariots, trained to war, or the chace; and that, faithful to their maſters, they never employed their ſtrength or courage but againſt their enemies. It is, however, certain, that a lion taken young, and brought up among domeſtic animals, will eaſily be accuſtomed to live and ſport with them; that he is mild and careſſing to his maſter, eſpecially when he is young; and that, if his natural ferocity ſometimes breaks out, it is rarely turned againſt thoſe who have been kind to him. But, as his paſſions are impetuous and vehement, it is not to be expected that the impreſſions of education will at all times be ſufficient to balance them: for this reaſon it is dangerous to let him ſuffer hunger long, or to vex him by ill-timed teazings: bad treatment not only irritates him, but he remembers it long, and meditates revenge. On

The Lion.

the other hand, he is exceedingly grateful, and ſeldom forgets benefits received. He has been often obſerved to diſdain weak or inſignificant enemies, to deſpiſe their inſults, and to pardon their offenſive liberties. When led into captivity, he will diſcover ſymptoms of uneaſineſs, without anger or peeviſhneſs: on the contrary, his natural temper ſoftens, he obeys his maſter, careſſes the hand that gives him food, and ſometimes gives life to ſuch animals as are thrown to him alive for prey: by this act of generoſity he ſeems to conſider himſelf as for ever bound to protect them; he lives peaceably with them; allows them a part, and ſometimes the whole, of his food; and will rather ſubmit to the pangs of hunger, than fill his ſtomach with the fruit of his beneficence. We may likewiſe obſerve, that the lion is not a cruel animal: he kills rather from neceſſity than choice, never deſtroying more than he eats; and whenever his appetite is ſatisfied, he is mild and peaceable.

The aſpect of the lion does not detract from the noble and generous qualities of his mind. His figure is reſpectable; his looks are determined; his gate is ſtately; and his voice is tremendous. In a word, the body of the lion appears to be the beſt model of ſtrength joined to agility. The force of his muſcles is expreſſed by his prodigious leaps and bounds, often 20 feet at once; by the briſk motion of his tail, a ſingle ſweep of which is ſufficient to throw a man to the ground; by the eaſe with which he moves the ſkin of his face, and particularly of his forehead; and, laſtly, by the faculty of erecting and agitating the hair of his main when irritated.

Lions are very ardent in their amours: when the female is in ſeaſon, ſhe is often followed by eight or ten males, who roar inceſſantly, and enter into furious engagements, till one of them completely overcomes the reſt, takes peaceable poſſeſſion of the female, and carries her off to ſome ſecret receſs. The lioneſs brings forth her young in the ſpring, and produces but once every year.

All the paſſions of the lion, the ſoft paſſion of love not excepted, are exceſſive; the love of offſpring is extreme: the lioneſs is naturally weaker, leſs bold, and more gentle than the lion; but ſhe becomes perfectly rapacious and terrible when ſhe has young. Then ſhe exhibits more courage than the male; ſhe regards no danger; ſhe attacks indifferently men and all other animals, kills them, and carries them to her young ones, whom ſhe thus early inſtructs to ſuck their blood and tear their fleſh. She generally brings forth in the moſt ſecret and inacceſſible places; and, when afraid of a diſcovery, ſhe endeavours to conceal the traces of her feet, by returning frequently on her ſteps, or rather by effacing them with her tail; and, when the danger is great, ſhe carries off her young, and conceals them ſomewhere elſe. But, when an actual attempt is made to deprive her of her young, ſhe becomes perfectly furious, and defends them till ſhe be torn to pieces.

The lion ſeldom goes abroad in the middle of the day; he goes round in the evening and night, in queſt of prey. He is afraid of fire, and never approaches the artificial fires made by the ſhepherds for the protection of their flocks; he does not trace other animals by the ſcent, but is obliged to truſt to his eyes. Many hiſtorians have even miſrepreſented him as incapable of finding out his prey; but that he is obliged to the jackal, an animal of exquiſite ſcent, in order to provide for him, and that this animal either accompanies or goes before him for this purpoſe. The jackal is a native of Arabia, Libya, *&c.* and, like the lion, lives upon prey: perhaps ſometimes he follows the lion, but it is with a view to pick up what he leaves behind, not to provide for him; for, being a ſmall and feeble animal, he ought rather to fly from than to ſerve the lion.

The lion, when hungry, will attack any animal that preſents itſelf: but he is ſo very formidable, that all endeavour to avoid his rencounter; this circumſtance often obliges him to conceal himſelf, and lie in wait till ſome animal chances to paſs. He lies ſquat on his belly in a thicket; from which he ſprings with ſuch force and velocity, that he often ſeizes them at the firſt bound. He endures hunger longer than thirſt; he ſeldom paſſes water without drinking, which he does by lapping like a dog. For his ordinary ſubſiſtence, he requires about 15 pounds of raw fleſh each day.

The roaring of the lion is ſo ſtrong and loud, that it reſembles the rumbling of diſtant thunder. His roaring is his ordinary voice; but when he is irritated, his cry is ſhorter, repeated more ſuddenly, and is ſtill more terrible than the roaring: beſides, he beats his ſides with his tail, ſtamps with his feet, erects and agitates the hair of his head and main, moves the ſkin of his face, ſhows his angry teeth, and lolls out his tongue.

The gait of the lion is ſtately, grave, and ſlow, tho' always in an oblique direction. His movements are not equal or meaſured, but conſiſt of leaps and bounds; which prevents him from ſtopping ſuddenly, and makes him often overleap his mark. When he leaps upon his prey, he makes a bound of 12 or 15 feet, falls above it, ſeizes it with his fore-feet, tears the fleſh with his claws, and then devours it with his teeth.

The lion, however terrible, is hunted by large dogs, well ſupported by men on horſeback: they diſlodge him, and oblige him to retire. But it is neceſſary that both the dogs and horſes be trained before-hand; for almoſt every animal frets and flies as ſoon as he feels the very ſmell of a lion. His ſkin, although hard and firm, does not reſiſt either a ball or a javelin: however, he is ſeldom killed by a ſingle ſtroke; and is more frequently taken by addreſs than force. They put a live animal above a deep pit covered with light ſubſtances, and thus decoy him into the ſnare.

The Tiger.

II. The *Tigris*, or Tiger. The ſize of this animal, according to ſome authors, is larger, and, according to others, ſomewhat leſs, than the lion. M. de la Landemagon aſſures us, that he has ſeen a tiger in the Eaſt-Indies 15 feet long, including undoubtedly the length of the tail, which, ſuppoſing it to be four feet, makes the body of the tiger about 10 feet in length. The ſkeleton preſerved in the cabinet of the French king, indicates that the animal was about ſeven feet long from the point of the muzzle to the origin of the tail; but then it muſt be conſidered that he was caught young, and lived all his days in confinement. The head of the tiger is large and roundiſh; and the ears are ſhort, and at a great diſtance from each other. The form of the body has a great reſemblance to that of the panther. The ſkin is of a darkiſh yellow colour, ſtriped with long black ſtreaks; the hair is ſhort, ex-

excepting on the ſides of the head, where it is about four inches long. The point of the tail is black, and the reſt of it is interſperſed with black rings. His legs and claws reſemble thoſe of the lion, only the legs are much ſhorter in proportion to the ſize of the animal.

The Tiger.

The tiger is more ferocious, cruel, and ſavage than the lion. Although gorged with carnage, his thirſt for blood is not appeaſed; he ſeizes and tears in pieces a new prey with equal fury and rapacity, the very moment after devouring a former one; he lays waſte the country he inhabits; he neither dreads the aſpect nor the weapons of men; puts to death whole troops of domeſtic animals; and attacks young elephants, rhinoceros's, and ſometimes even braves the lion himſelf. The tiger ſeems to have no other inſtinct but a conſtant thirſt after blood, a blind fury which knows no bounds or diſtinction, and which often ſtimulates him to devour his own young, and to tear the mother in pieces for endeavouring to defend them. He lies in wait on the banks of rivers, &c. where the heat of the climate obliges other animals to repair for drink. Here he ſeizes his prey, or rather multiplies his maſſacres; for he no ſooner kills one animal, than he flies with equal fury upon the next, with no other view but to plunge in his head into their bodies and drink their blood. However, when he kills a large animal, as a horſe or a buffalo, he ſometimes does not tear out the entrails on the ſpot; but, to prevent any interruption, he drags them off to the wood, which he performs with incredible ſwiftneſs. This is a ſufficient ſpecimen of the ſtrength of this rapacious animal.

Neither force, reſtraint, or violence, can tame the tiger. He is equally irritated with good as with bad treatment: he tears the hand which nouriſhes him with equal fury as that which adminiſters blows: he roars and is enraged at the ſight of every living creature. Almoſt every natural hiſtorian agrees in this horrible character.

It is happy for other animals, that the ſpecies of the tiger is not numerous, and that they are confined to the warm climates. They are found in Malabar, Siam, Bengal, the interior parts of Africa, and, in general, in all the regions that are inhabited by the elephant and rhinoceros.

The tiger has always been a more rare animal than the lion; and yet brings forth an equal number of young, namely, four or five at a litter. The female is furious at all times; but, when her young are attempted to be taken from her, her rage is redoubled: ſhe braves every danger; ſhe purſues the raviſhers, who are obliged, when hard preſſed, to drop one of the young in order to retard her motion; ſhe ſtops, takes it up, and carries it into ſome ſecret part of the foreſt; but ſhe inſtantly returns and purſues the hunters into their villages or boats.

The tiger moves the ſkin of his face, grinds his teeth, and roars, like the lion; but the ſound of his voice is different.

III. The *Pardus*, or PANTHER.—It is about the ſize of a large dog, and has a great reſemblance to a domeſtic cat. The tongue is rough, and remarkably red; the teeth are ſtrong and ſharp; the ſkin is exceedingly beautiful, being of a yellow colour, variegated with roundiſh black ſpots, and the hair is ſhort.

The panther inhabits Africa, from Barbary to the remoteſt parts of Guinea. It has a cruel and ferocious aſpect; his motions are briſk and lively; his cry reſembles that of an enraged dog, but is more ſtrong and rough. He is not ſo perfectly ungovernable as the tiger: but, notwithſtanding all attempts to render him obedient and tractable, he may rather be ſaid to be ſubdued than tamed; for he never entirely loſes his natural ferocity. Accordingly, when kept with a view to the hunting of bucks, goats, or other animals, great care is neceſſary in training him, and ſtill greater in conducting him. When leading out to the field, they put him in a cage and carry him on a cart. When the game is ſprung, they open the door of the cage; he inſtantly ſprings towards the animal, often ſeizes him in a few bounds, throws him to the ground, and ſtrangles him. But, if he happens to miſs his aim, he becomes mad with rage, and ſometimes falls upon his maſter, who, in order to prevent accidents of this kind, generally carries along with him pieces of fleſh, or perhaps a lamb or a kid, which he throws to him in order to appeaſe his fury.

The Panther.

The panther, according to Buffon, is no where to be found but in Africa, and the regions of the Indies.

The ancients were well acquainted with theſe animals. Theſe, and the leopards, were the *Variæ* and *Pardi* of the old writers: one ſhould think that the Romans would have exhauſted the deſarts of Africa by the numbers they drew from thence for their public ſhews. Scaurus exhibited at one time 150 panthers; Pompey the Great, 410; Auguſtus, 420. Probably they thinned the coaſts of Mauritania of theſe animals, but they ſtill ſwarm in the ſouthern parts of Guinea.—Oppian deſcribes two ſpecies of panthers, a large ſpecies and a ſmall one; the firſt of which has a ſhorter tail than the leſſer, and may poſſibly be this kind.—An animal of this ſpecies is found in Buckharia, called there *Babr*: it is ſeven feet long, very deſtructive to horſes, and even camels; the ſkin is fine, and valued in Ruſſia at 1l. Sterling.—In China there is a moſt remarkable kind, called there *Louchu*, whoſe ſkins ſell for 6l. Sterling a-piece. It muſt here alſo be obſerved, that there are in the furriers ſhops in London, ſkins in moſt reſpects reſembling thoſe of the panther; which, they aſſure us, come from the Spaniſh ſettlements in the Weſt Indies: Theſe ſkins equal thoſe of the old continent in beauty and ſize.

Though Mr Buffon denies the panther to be an inhabitant of America, yet Mr Pennant is of opinion that the ſame, or a variety at leaſt, inhabits that country. 1. The figure of the ſpecies deſcribed by *Faber*, (*Hiſt. An. Nov. Hiſp.* p. 498.) under the name of *Tigris Mexicana*, agrees exactly with that of the panther, as does alſo the deſcription in general. 2. Every other animal of this genus, which has yet been diſcovered in America, is far inferior in ſize and ſtrength to this; whoſe common height, Faber ſays, is four or five feet, and whoſe prey is wild cattle, horſes, &c. *M. Condamine*, and *Le Pere Cajetan Cattaneo*, ſpeak of the tigers (*i. e.* the panthers) of America, as equal and even ſuperior in ſize to thoſe of Africa, and the colour as bright as gold; and Ulloa deſcribes them as big as little horſes. 3. Notwithſtanding the venders of furs are not entirely to be relied on as to the countries their goods come from, yet the general opinion of the whole trade, that theſe ſkins were the product of Spaniſh America, is a further proof of their being common to both continents.

The Once.

IV. The *Onca*, or Once, is leſs than the panther; the tail is longer; the hair is likewiſe longer, and of a whitiſh grey colour. The once is eaſily tamed; and is employed in hunting in ſeveral parts of Aſia, where dogs are very ſcarce. He has not the delicate ſcent of a dog; does not trace other animals by the ſmell; neither can he run them down in a fair chace; but lies in wait for their approach, and then darts upon them unawares. He leaps ſo nimbly, that he eaſily clears a ditch or a wall ſeveral feet high; beſides, he often climbs trees, waits till ſome animal paſſes, and inſtantly leaps upon them. This method of catching their prey, is practiſed by the panther and leopard, as well as by the once.—The once inhabit Barbary, Perſia, Hyrcania, and China; from which laſt place the ſkins are brought into Ruſſia, and ſold for 20 s. a-piece.

The Leopard.

V. The *Pardalis*, or Leopard, differs from the panther and the once, in the beauty of his colour, which is a lively yellow, with ſmaller ſpots than thoſe of the two latter, and diſpoſed in groups. He is larger than the once, and leſs than the panther. The leopard inhabits the Eaſt Indies; one kept ſome years ago in the Tower, ſeemed a good-natured animal.—A variety called the *hunting leopard*, is about the ſize of a large gre-hound; of a long make, narrow cheſt, legs very long. He inhabits India, where he is tamed and trained for the chace of antelopes: carried in a ſmall kind of waggon, hood-winked and chained, till it approaches the herd: when firſt unchained, does not make its attempt, but winds along the ground, ſtopping and concealing itſelf, till it gets a proper advantage; then darts on the animals with ſurpriſing ſwiftneſs; overtakes them by the rapidity of its bounds; but if it does not ſucceed in its firſt efforts, conſiſting of five or ſix amazing leaps, miſſes its prey: loſing its breath, and finding itſelf unequal in ſpeed, it ſtands ſtill, gives up the point for that time, and readily returns to its maſter.

The Lynx.

VI. The Lynx is about 2½ feet long and 15 inches high. He has a great reſemblance to the cat; but his ears are longer, and his tail is much ſhorter; his hair is ſtreaked with yellow, white, and black colours. The lynx is an inhabitant of Muſcovy, Poland, Canada, &c. His eyes are brilliant, his aſpect is ſoft, and his air is gay and ſprightly: like the cat, he covers his urine with earth; he howls ſomething like the wolf, and is heard at a conſiderable diſtance; he does not run like the dog or wolf, but walks and leaps like a cat; he purſues his prey even to the tops of trees; neither wild cats nor ſquirrels can eſcape him; he lies in wait for ſtags, goats, hares, &c. and darts ſuddenly upon them; he ſeizes them by the throat and ſucks their blood, then opens the head and eats the brain; after this, he frequently leaves them, and goes in queſt of freſh prey. The colour of his ſkin changes according to the ſeaſon or the climate; the winter-furs are more beautiful than thoſe of ſummer. Theſe furs are valuable for their ſoftneſs and warmth: numbers are annually imported from North America, and the north of Europe and Aſia; the farther north and eaſt they are taken, the whiter they are, and the more diſtinct the ſpots. Of theſe the moſt elegant kind is called *irbys*, whoſe ſkin ſells on the ſpot for one pound Sterling. The ancients * celebrated the great quickneſs of the lynx's ſight; and feigned that its urine was converted into a precious ſtone.

Plin. viii. xxviii. 8.

The Cat.

VII. The *Catus*, or Cat, wild, and domeſtic.

1. The *wild* cat differs not ſpecifically from the tame; the latter being originally of the ſame kind, but altered in colour, and in ſome other trifling accidents, as are common to animals reclaimed from the woods and domeſticated.

Wild.

The cat in its ſavage ſtate is three or four times as large as the houſe-cat; the head larger, and the face flatter. The teeth and claws are tremendous: its muſcles very ſtrong, as being formed for rapine: the tail is of a moderate length, but very thick, marked with alternate bars of black and white, the end always black: the hips and hind part of the lower joints of the leg, are always black: the fur is very ſoft and fine. The general colour of theſe animals is of a yellowiſh white, mixed with a deep grey: theſe colours, though they appear at firſt ſight confuſedly blended together, yet on a cloſe inſpection will be found to be diſpoſed like the ſtreaks on the ſkin of the tiger, pointing from the back downwards, riſing from a black liſt that runs from the head along the middle of the back to the tail.

This animal may be called the *Britiſh tiger*; it is the fierceſt and moſt deſtructive beaſt we have; making dreadful havock among our poultry, lambs, and kids. It inhabits the moſt mountainous and woody parts of theſe iſlands, living moſtly in trees, and feeding only by night. It multiplies as faſt as our common cats; and often the females of the latter will quit their domeſtic mates, and return home pregnant by the former.

They are taken either in traps, or by ſhooting: in the latter caſe, it is very dangerous only to wound them; for they will attack the perſon who injured them, and have ſtrength enough to be no deſpicable enemy. Wild cats were formerly reckoned among the beaſts of chace; as appears by the charter of Richard II. to the abbot of Peterborough, giving him leave to hunt the hare, fox, and wild cat. The uſe of the fur was in lining of robes: but it was eſteemed not of the moſt luxurious kind; for it was ordained, "that no abbeſs or nun ſhould uſe more coſtly apparel than ſuch as is made of lambs or cats ſkins." In much earlier times it was alſo the object of the ſportſman's diverſion.

Tame.

2. The *tame* or *domeſtic* cat is ſo well known, that it requires no deſcription. It is an uſeful, but deceitful domeſtic. Although when young they are playful and gay, they poſſeſs at the ſame time an innate malice and perverſe diſpoſition, which increaſes as they grow up, and which education learns them to conceal, but never to ſubdue. Conſtantly bent upon theft and rapine, though in a domeſtic ſtate, they are full of cunning and diſſimulation; they conceal all their deſigns; ſeize every opportunity of doing miſchief, and then fly from puniſhment. They eaſily take on the habits of ſociety, but never its manners; for they have only the appearance of friendſhip and attachment. This diſingenuity of character is betrayed by the obliquity of their movements, and the ambiguity of their looks. In a word, the cat is totally deſtitute of friendſhip; he thinks and acts for himſelf alone. He loves eaſe, ſearches for the ſofteſt and warmeſt places to repoſe himſelf. The cat is likewiſe extremely amorous; and,

which is very ſingular, the female is more ardent than the male; ſhe not only invites, but ſearches after and calls upon him to ſatisfy the fury of her deſires; and, if the male diſdains or flies from her, ſhe purſues, bites, and in a manner compels him. This heat of paſſion in females laſts but nine or ten days, and happens twice in the year, namely, in the ſpring and autumn; however, in ſome it happens thrice or four times in the year. The female goes with young 55 or 58 days, and generally produces four or five at a litter. As the male has an inclination to deſtroy the young, the female takes care to conceal them from him; and, when ſhe is apprehenſive of a diſcovery, ſhe takes them up in her mouth one by one, and hides them in holes or inacceſſible places. When ſhe has nurſed a few weeks, ſhe brings them mice, ſmall birds, &c. in order to learn them to eat fleſh. But it is worth notice, that theſe careful and tender mothers ſometimes become unnaturally cruel, and devour their own offſpring.

The cat is incapable of reſtraint, and conſequently of being educated to any extent. However, we are told, that the Greeks in the iſland of Cyprus trained this animal to catch and devour ſerpents, with which that iſland was greatly infeſted. This, however, was not the effect of obedience, but of a general taſte for ſlaughter; for he delights in watching, attacking, and deſtroying all kinds of weak animals indifferently. He has no delicacy of ſcent, like the dog; he hunts only by the eye: neither does he properly purſue; he only lies in wait, and attacks animals by ſurpriſe: and after he has caught them, he ſports with and torments them a long time, and at laſt kills them (when his belly is full) purely to gratify his ſanguinary appetite.

The eye of the cat differs greatly from that of moſt other animals. The pupil is capable of a great degree of contraction and dilatation; it is narrow and contracted like a line during the day, round and wide in the dark; it is from this conformation of the eye that the cat ſees beſt in the night, which gives him a great advantage in diſcovering and ſeizing his prey.

Although cats live in our houſes, they can hardly be called *domeſtic* animals; they may rather be ſaid to enjoy full liberty; for they never act but according to their own inclination. Beſides, the greateſt part of them are half wild; they do not know their maſters, and frequent only the barns, out-houſes, &c. unleſs when preſſed with hunger.

Cats have a natural antipathy at water, cold, and bad ſmells. They love to baſk in the ſun, and to lie in warm places. They likewiſe have an affection for certain aromatic ſmells; they are tranſported with the root of the valerian.

Cats take about 18 months before they come to their full growth; but they are capable of propagation in 12 months, and retain this faculty all their life, which generally extends to nine or ten years. They eat ſlowly, and are peculiarly fond of fiſh. They drink frequently; their ſleep is light; and they often aſſume the appearance of ſleeping, when in reality they are meditating miſchief. They walk ſoftly, and without making any noiſe. As their hair is always dry, it eaſily gives out an electrical fire, which becomes viſible when rubbed a-croſs in the dark. Their eyes likewiſe ſparkle in the dark like diamonds.—The cat, when pleaſed, purres, and moves its tail: when angry, it ſpits, hiſſes, and ſtrikes with its foot. It drinks little: is fond of fiſh: it waſhes its face with its fore-foot, (Linnæus ſays, at the approach of a ſtorm:) it always lights on its feet: it is even proverbially tenacious of life.

Our anceſtors ſeem to have had a high ſenſe of the utility of this animal. That excellent prince *Hoel dda*, or Howel the Good, did not think it beneath him (among his laws relating to the prices, &c. of animals *), to include that of the cat; and to deſcribe the qualities it ought to have. The price of a kitten before it could ſee was to be a penny; till it caught a mouſe, two-pence; when it commenced mouſer, fourpence. It was required beſides, that it ſhould be perfect in its ſenſes of hearing and ſeeing, be a good mouſer, have the claws whole, and be a good nurſe: but if it failed in any of theſe qualities, the ſeller was to forfeit to the buyer the third part of its value. If any one ſtole or killed the cat that guarded the prince's granary, he was to forfeit a milch-ewe, its fleece and lamb; or as much wheat as, when poured on the cat ſuſpended by its tail (the head touching the floor), would form a heap high enough to cover the tip of the former. This laſt quotation is not only curious, as being an evidence of the ſimplicity of ancient manners, but it almoſt proves to a demonſtration, that cats are not aborigines of theſe iſlands, or known to the earlieſt inhabitants. The large prices ſet on them, (if we conſider the high value of ſpecie at that time †), and the great care taken of the improvement and breed of an animal that multiplies ſo faſt, are almoſt certain proofs of their being little known at that period.

The cat is found in almoſt every country in the world; and all the varieties in their appearance may be reaſonably enough attributed to the climates which produce them.

The Cat of *Angora*, is a variety with long hair, of a ſilvery whiteneſs, and ſilky texture; very long, eſpecially about the neck, where it forms a fine ruff: the hair on the tail very long and ſpreading: it is a large variety, found about Angora, the ſame country which produces the fine-haired goat. It degenerates after the firſt generation in this climate.

See figures of the principal ſpecies of *felis*, on plates CV. CVI. CVII.

FELL (Dr John), a very learned Engliſh divine and biſhop, entered a ſtudent at Chriſt-church, Oxford, 1636. In 1648, he was ejected by the parliamentary viſitors, being then in holy orders: and from that time to the reſtoration lived at Oxford a retired and ſtudious life. He was inſtalled canon of Chriſt-church, July 1660; and the year following, dean of that church; in which places he did great ſervices to the college, and reformed ſeveral abuſes. He was conſecrated biſhop of Oxford in 1675; and had leave to hold his deanry in *commendam*, that he might continue his ſervices to the college and univerſity. He publiſhed ſeveral works, and died in 1686.

FELLING *of* TIMBER.—Many circumſtances are well known and conſtantly obſerved in the felling of timber for building, which, though to a haſty obſerver they might appear trifling, yet prove, on experience, to be of the utmoſt conſequence. One thing obſerved by Mr De Buffon, which very greatly increaſes the ſolidity and ſtrength of timber, is, that the trees intended to be felled for ſervice ſhould firſt be ſtripped

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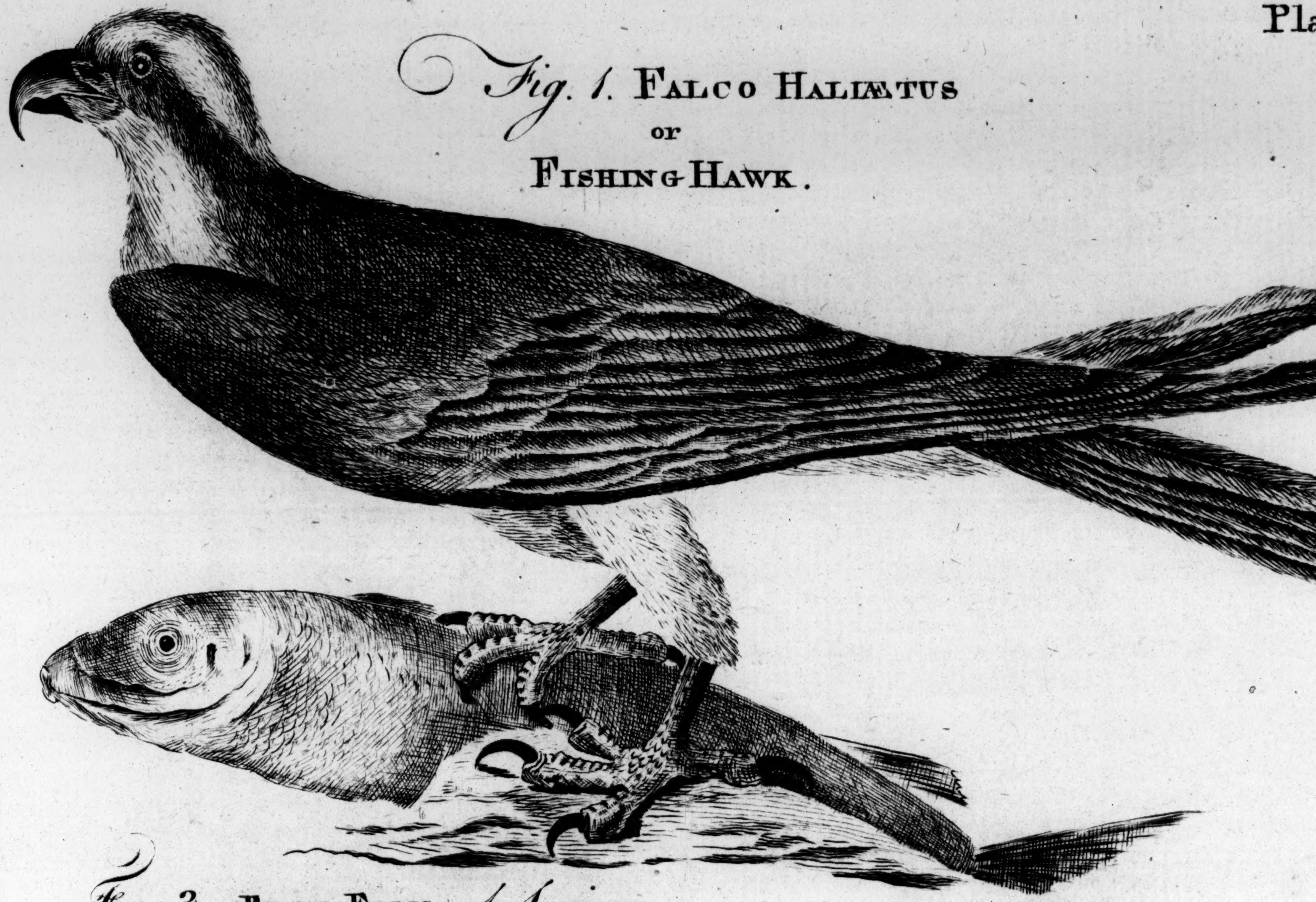
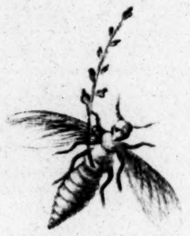
* *Leges Wallicæ*, p. 247, 248.

† *Anno* 948.

Plate CV.

Fig. 1. FALCO HALIÆTUS
or
FISHING-HAWK.





N°. 2.

Fig. 3. FROG-FISH *of Surinam.*

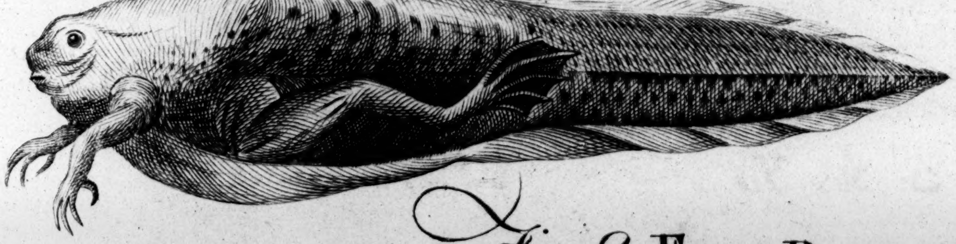


Fig. 2. FELIS DOMESTICUS
CAT of ANGORA.

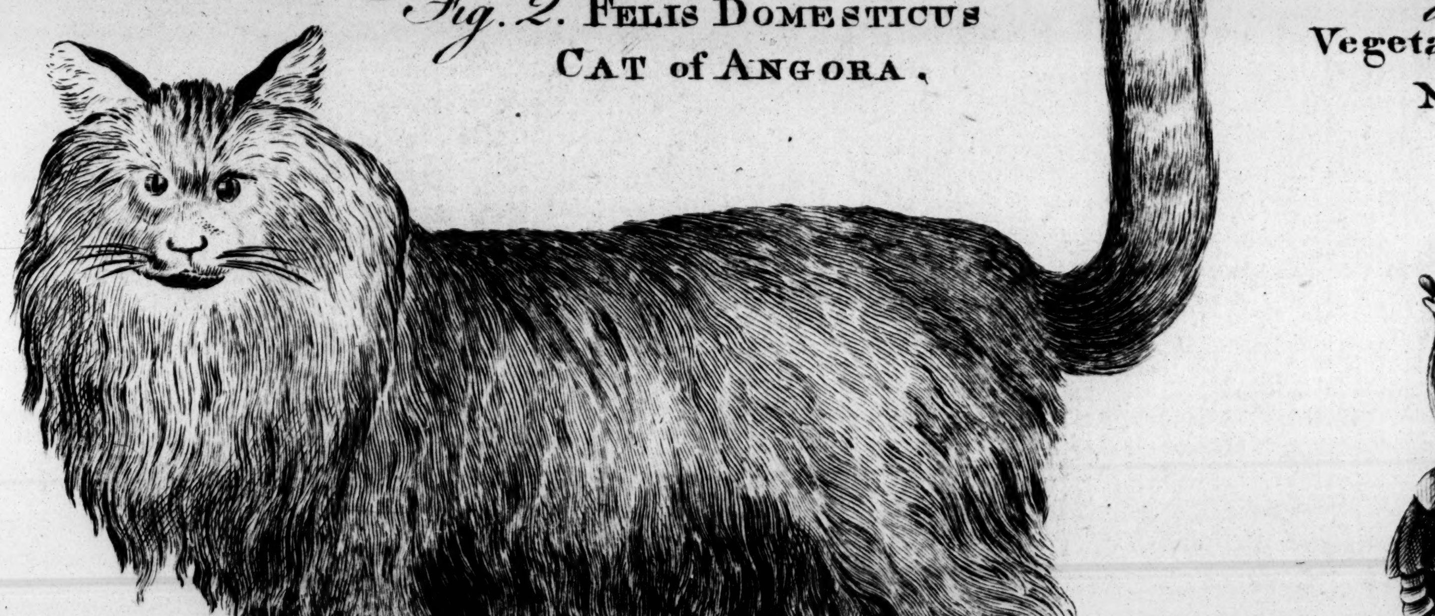
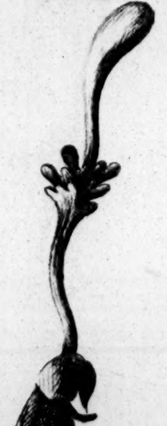


Fig. 4.
Vegetating FLY.
N°. I.



A Bell Sculp!

3 MA 53

Fig. 1. FELIS LEO
or
LION

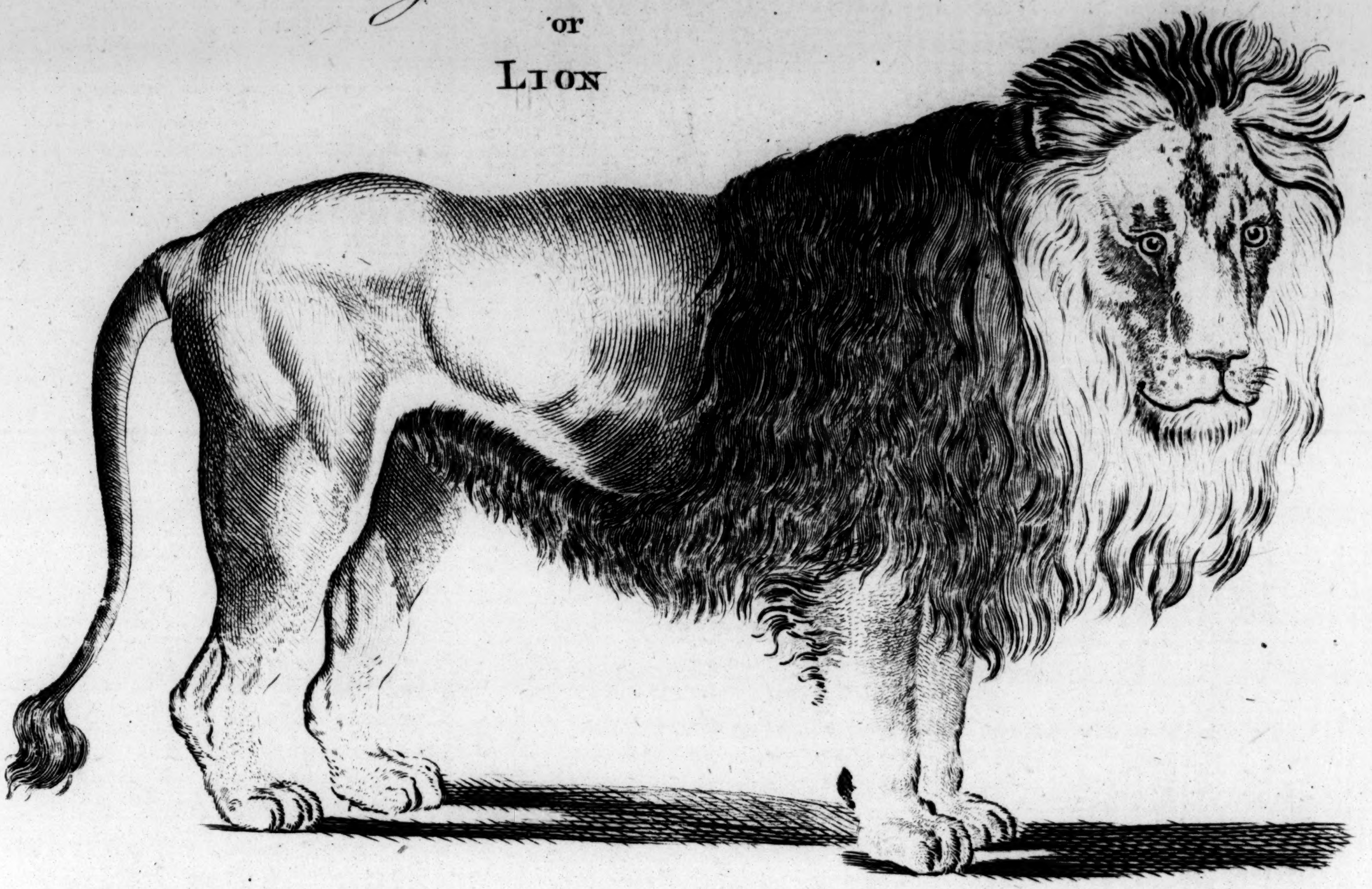
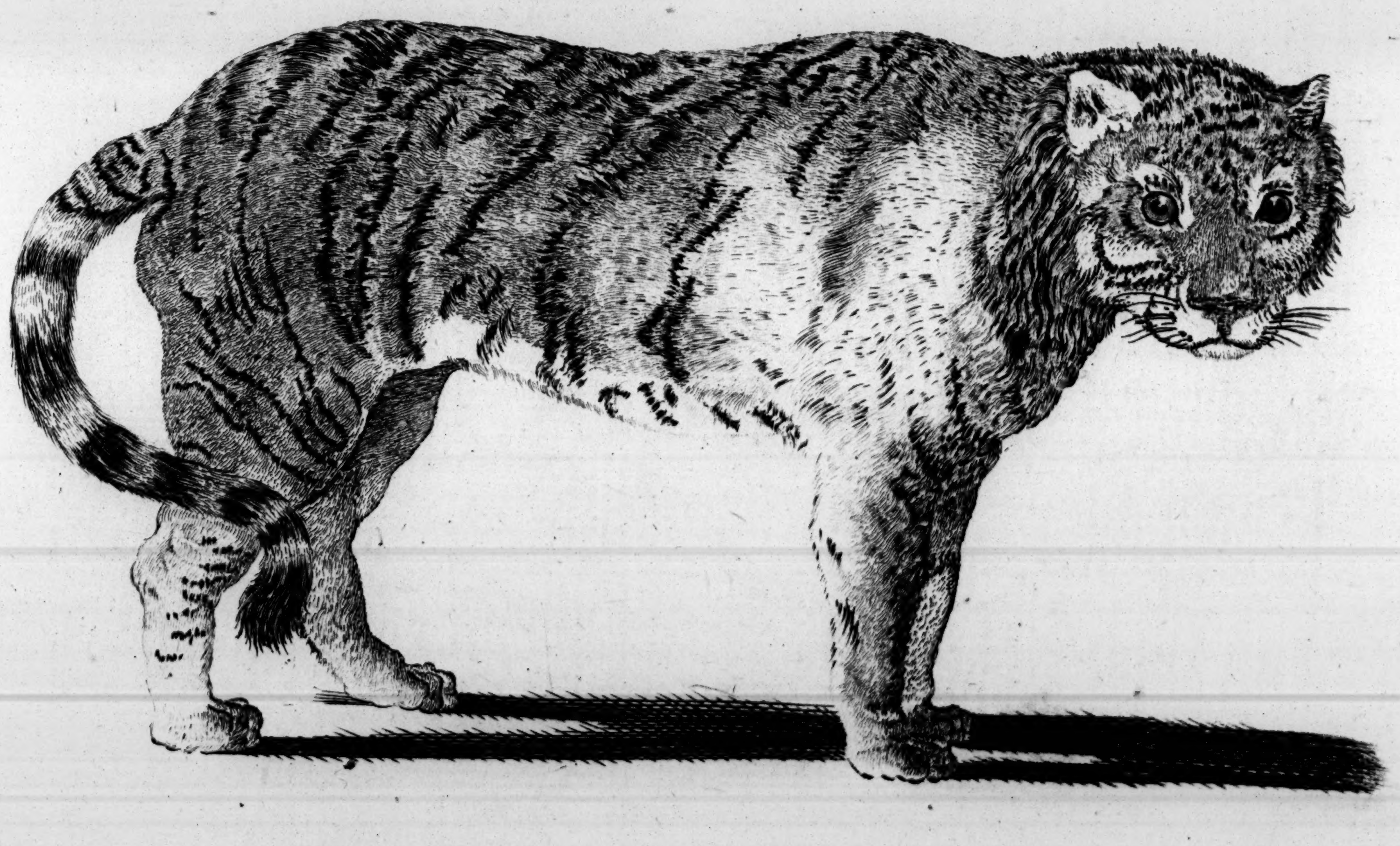


Fig. 2. FELIS TIGRIS
or
TIGER



A Bell Sculp^t

3 MA 53

of their bark, and ſuffered to ſtand and die upon the ſpot before the cutting. The ſappy part or blea of the oak, becomes by this means as hard and firm as the heart; and the real ſtrength and denſity of the wood has been proved, by many experiments, to be greatly increaſed by it: nor is this a practice of any detriment to the proprietor, ſince the remaining ſtumps of theſe trees ſend up their young ſhoots as vigorouſly as if they had been cut down in their natural condition.

When any tree is to be cut down for timber, the firſt thing to be taken care of is a ſkilful diſbranching of ſuch limbs as may endanger in its fall: many trees are utterly ſpoiled for want of a previous care of this kind. In arms of timber that are very great, it is always neceſſary to chope or ſink in them cloſe to the bole, and then, meeting it with down-right ſtrokes, it will be ſevered from the tree without ſplitting. In felling the tree, take care always to cut it as cloſe to the ground as poſſible, unleſs it is intended to be grubbed up: and the doing that is of advantage both to the timber, and to the wood; for timber is never ſo much valued, if it be known to grow out of old ſtocks.

FELLOWSHIP, COMPANY, or *Diſtributive-Proportion*, in arithmetic. See ARITHMETIC, n° 15.

FELO DE SE, in law, a perſon that lays deliberately violent hands on himſelf, and is the occaſion of his untimely death, whether by hanging, drowning, ſtabbing, ſhooting, or any other way.

FELON, in law, a perſon guilty of felony. See FELONY.

Blackſt. Comment.

FELONY, in the general acceptation of the law, compriſes every ſpecies of crime, which occaſioned at common law the forfeiture of lands or goods. This moſt frequently happens in thoſe crimes, for which a capital puniſhment either is or was to be inflicted: for thoſe felonies that are called *clergyable*, or to which the benefit of clergy extends, were anciently puniſhed with death in all lay, or unlearned, offenders; tho' now, by the ſtatute-law, that puniſhment is for the firſt offence univerſally remitted. Treaſon itſelf, ſays Sir Edward Coke, was anciently compriſed under the name of *felony*: and in confirmation of this we may obſerve, that the ſtatute of treaſons, 25 Edw. III. *c.* 2. ſpeaking of ſome dubious crimes, directs a reference to parliament; that it may be there adjudged, " whether they be treaſon or *other* felony." All treaſons, therefore, ſtrictly ſpeaking, are felonies; tho' all felonies are not treaſon. And to this alſo we may add, that all offences, now capital, are in ſome degree or other felony: but this is likewiſe the caſe with ſome other offences, which are not puniſhed with death; as ſuicide, where the party is already dead; homicide by chance-medley, or in ſelf-defence; and petit-larceny, or pilfering; all which are, (ſtrictly ſpeaking) felonies, as they ſubject the committers of them to forfeitures. So that, upon the whole, the only adequate definition of felony ſeems to be that which is before laid down; *viz.* an offence which occaſions a total forfeiture of either lands, or goods, or both, at the common law; and to which capital or other puniſhment may be ſuperadded, according to the degree of guilt.

To explain this matter a little farther: The word *felony*, or *felonia*, is of undoubted feodal original, being frequently to be met with in the books of feuds, &c; but the derivation of it has much puzzled the juridical lexicographers, Pratæus, Calvinus, and the reſt: ſome deriving it from the Greek, φηλος, " an impoſtor or deceiver;" others from the Latin, *fallo feſelli*, to countenance which they would have it called *fellonia*. Sir Edward Coke, as his manner is, has given us a ſtill ſtranger etymology; that it is *crimen animo felleo perpetratum*, " with a bitter or galliſh inclination." But all of them agree in the deſcription, that it is ſuch a crime as works a forfeiture of all the offender's lands or goods. And this gives great probability to Sir Henry Spelman's Teutonic or German derivation of it: in which language indeed, as the word is clearly of feodal original, we ought rather to look for its ſignification, than among the Greeks and Romans. *Fe-lon* then, according to him, is derived from two northern words: FEE, which ſignifies (we well know) the fief, feud, or beneficiary eſtate; and LON, which ſignifies price or value. Felony is therefore the ſome as *pretium feudi*, the conſideration for which a man gives up his fief; as we ſay in common ſpeech, ſuch an act is as much as your life, or eſtate, is worth. In this ſenſe it will clearly ſignify the feodal forfeiture, or act by which an eſtate is forfeited, or eſcheats, to the lord.

To confirm this, we may obſerve, that it is in this ſenſe, of forfeiture to the lord, that the feodal writers conſtantly uſe it. For all thoſe acts, whether of a criminal nature or not, which at this day are generally forfeitures of copyhold eſtates, are ſtyled *feloniæ* in the feodal law: " *ſcilicet, per quas feudum amittitur.*" As, " *ſi domino deſervire noluerit;—ſi per annum et diem ceſſaverit in petenda inveſtitura;—ſi dominum ejuravit, i. e. negavit ſe a domino feudum habere;—ſi a domino, in jus eum vocante, ter citatus non comparuerit;*"—all theſe, with many others, are ſtill cauſes of forfeiture in our copyhold eſtates, and were denominated *felonies* by the feodal conſtitutions. So likewiſe injuries of a more ſubſtantial or criminal nature were denominated *felonies*, that is, forfeitures: as aſſaulting or beating the lord; vitiating his wife or daughter, " *ſi dominum cucurbitaverit*, i. e. *cum uxore ejus concubuerit;*" all theſe are eſteemed felonies, and the latter is expreſsly ſo denominated, " *ſi fecerit feloniam, dominum forte cucurbitando.*" And as theſe contempts, or ſmaller offences, were felonies or acts of forfeiture, of courſe greater crimes, as murder and robbery, fell under the ſame denomination. On the other hand, the lord might be guilty of felony, or forfeit his ſeignory to the vaſſal, by the ſame act as the vaſſal would have forfeited his feud to the lord. " *Si dominus commiſit feloniam, per quam vaſallus amitteret feudum ſi eam commiſerit in dominum, feudi proprietatem etiam dominus perdere debet.*" One inſtance given of this ſort of felony in the lord is beating the ſervant of his vaſſal, ſo as that he loſes his ſervice; which ſeems merely in the nature of a civil injury, ſo far as it reſpects the vaſſal. And all theſe felonies were to be determined, " *per laudamentum ſive judicium parium ſuorum*," in the lord's court; as with us forfeitures of copyhold lands are preſentable by the homage in the court-baron.

Felony, and the act of forfeiture to the lord, being thus ſynonymous terms in the feodal law, we may eaſily trace the reaſon why, upon the introduction of that law into England, thoſe crimes which induced ſuch forfeiture or eſcheat of lands (and, by a ſmall deflexion from the original ſenſe, ſuch as induced the forfeiture of goods alſo) were denominated *felonies*. Thus it was that ſuicide, robbery, and rape, were felonies; that is, the conſequence of ſuch crimes was forfeiture; till by long uſe we began to ſignify by the term of *felony* the actual crime committed, and not the penal conſequence. And upon this ſyſtem only can we account for the cauſe, why treaſon in ancient times was held to be a ſpecies of felony; viz. becauſe it induced a forfeiture.

Hence it follows, that capital puniſhment does by no means enter into the true idea and definition of *felony*. Felony may be without inflicting capital puniſhment, as in the caſes inſtanced of ſelf-murder, excuſable homicide, and petit larciny: and it is poſſible that capital puniſhments may be inflicted, and yet the offence be no felony; as in caſe of hereſy by the common law, which, though capital, never worked any forfeiture of lands or goods, an inſeparable incident to felony. And of the ſame nature was the puniſhment of ſtanding mute, without pleading to an indictment; which at the common law was capital, but without any forfeiture, therefore ſuch ſtanding mute was no felony. In ſhort, the true criterion of felony is forfeiture: for, as Sir Edward Coke juſtly obſerves, in all felonies which are puniſhable with death, the offender loſes all his lands in fee-ſimple, and alſo his goods and chattels; in ſuch as are not puniſhable, his goods and chattels only.

The idea of felony is indeed ſo generally connected with that of capital puniſhment, that we find it hard to ſeparate them; and to this uſage the interpretations of the law do now conform. And therefore, if a ſtatute makes any new offence felony, the law implies that it ſhall be puniſhed with death, viz. by hanging, as well as with forfeiture: unleſs the offender prays the benefit of clergy; which all felons are entitled once to have, unleſs the ſame is expreſsly taken away by ſtatute.

Felonies by ſtatute are very numerous; and as this work will not admit of a proper enumeration, we muſt refer to the Table of the quarto edition of the Statutes, where they are ſet forth in alphabetical order.

FELT, in commerce, a ſort of ſtuff deriving all its conſiſtence merely from being fulled, or wrought with lees and ſize, without either ſpinning or weaving.

Felt is made either of wool alone, or of wool and hair. Thoſe of French make, $3\frac{1}{2}$ yards long, and $1\frac{1}{2}$ broad, for cloaks, pay each 2 l. 14 s. $1\frac{80}{100}$ d. on importation; and draw back 1 l. 12 s. 3 d. on exporting them again.

FELTRIA, (anc. geog.) a town on the borders of Rhætia towards Italy. Now *Felitri*, in the territory of Venice, on the Piava. E. Long. 12. 16. N. Lat. 46°.

FELUCCA, in ſea-affairs, a little veſſel armed with ſix oars, frequent in the Mediterranean; which has this peculiarity, that its helm may be applied either in the head or ſtern, as occaſion requires.

FEMALE, (FÆMINA,) a term peculiar to animals, ſignifying that ſex which conceives and generates its young within itſelf. See SEX and GENERATION.

FEMALE is alſo applied, figuratively, to things without life, from the reſemblance they bear to the females of animals. Thus we ſay a

FEMALE-*Screw*. See SCREW.
FEMALE-*Flower*. See *Femineus* FLOS.
FEMALE-*Plant*. See *Feminea* PLANTA.

FEMME COVERT, in law, a married woman. See COVERTURE.

FEMME *Sole*, an unmarried woman, whoſe debts, contracted before marriage, become thoſe of her huſband after it.

A femme-ſole merchant, is where a woman, in London, uſes a trade alone, without her huſband; on which account ſhe ſhall be charged without him.

FEMININE, in grammar, one of the genders of nouns. See GENDER.

The feminine gender is that which denotes the noun or name to belong to a female. In the Latin, the feminine gender is formed of the maſculine, by altering its termination; particularly by changing *us* into *a*. Thus, of the maſculine *bonus equus*, "a good horſe," is formed the feminine *bona equa*, "a good mare;" ſo, of *parvus homo*, "a little man," is formed *parva fæmina*, "a little woman," &c.

In French, the feminine gender is expreſſed, not by a different termination, but by a different article: thus, *le* is joined to a male, and *la* to a female.

In Engliſh, we are generally more ſtrict, and expreſs the difference of ſex, not by different terminations, nor by different particles, but different words; as boar and ſow, boy and girl, brother and ſiſter, &c. —though ſometimes the feminine is formed by varying the termination of the male into *eſs*; as in abbot, abbeſs, &c.

FEMUR, OS FEMORIS, in anatomy. See there, n° 57.

FEN, a place overflowed with water, or abounding with bogs. See BOG and DRAINING.

Fens are either made up of a congeries of bogs; or conſiſt of a multitude of pools or lakes, with dry ſpots of land intermixed, like ſo many little iſlands.

Several ſtatutes have been made for the draining of fens, chiefly in Kent, Cambridgeſhire, Bedfordſhire, and Lincolnſhire; and by a late act, 11 Geo. II. commiſſioners ſhall be appointed for the effectually draining and preſerving of the fens in the iſle of Ely, who are authoriſed to make drains, dams, and proper works thereon; and they may charge the landholders therein with a yearly acre-tax, and, in default of payment, ſell the defender's lands.

The wet grounds called *fens*, in Lincolnſhire and elſewhere in England, bring many advantages to the inhabitants of thoſe counties. Fowl and fiſh are very plentiful in them. The pike and eels are large and eaſily caught, but they are uſually coarſe. The duck, mallard, and teal, are in ſuch plenty as is ſcarce to be conceived. They are taken in DECOYS by prodigious flocks at a time. They ſend theſe fowl from Lincolnſhire to London, twice a-week, on horſeback, from Michaelmas to Lady-day; and one decoy will furniſh 20 dozen, or more, twice a-week, for the whole ſeaſon in this manner. The decoy-men contract with the people, who bring them to London at a certain rate, and they are obliged to take off their hands the whole number that is catched. Two teal are uſually reckoned equal to one duck; and ſix ducks and 12 teal are accounted a dozen of wild-fowl; and the uſual market-price is about 9s. for ſuch a dozen. About midſummer, during the moulting ſeaſon, a great number alſo are deſtroyed by the people in the neighbourhoods. The poor birds at this ſeaſon are neither able to ſwim nor fly well; and the people going in with boats among the reeds where they lie, knock them down with long poles. A little before Michaelmas, vaſt flights of theſe birds arrive at the decoys from other places; they ſoon grow fat in them, and continue there a prey to the maſters or owners, as long as the decoys are unfrozen; but, when they are iced over, they fly away again, and go to the neighbouring ſeas for food.

The fens alſo abound in a ſort of herbage that is very nouriſhing to cattle. Sheep and horſes always grow fat upon it. Theſe fens are common, and the owners of cattle mark them that they may be known. It is remarkable, that, though all is open, the cattle uſed to one particular ſpot of ground ſeldom leave it, but the owner may always find them in or near the ſame place. The fens have many large and deep drains. In theſe the pike and eels grow to a vaſt ſize: and they are full of geeſe which feed on the graſs; but theſe eat rank and muddy, and may even be ſmelt as ſoon as a perſon comes into the room where they are roaſting. But the people have another very great advantage from theſe birds beſides the eating of them, namely, their feathers and quills; and the produce of theſe is ſo great, that the cuſtomhouſe-books in the town of Boſton ſhew, that there are frequently ſent away in one year 300 bags of feathers, each containing a hundred and a half weight. Each pound of feathers brings in the owner twopence; and it may be thought ſtrange by people unacquainted with theſe things, but it is a certain truth, that the owners pull them five or ſix times a-year for the feathers, and three times for the quills. Each pulling comes to about a pound, and many people have 1000 geeſe at a time, or more. They are kept at no charge, except in deep ſnowy weather, when they are obliged to feed them with corn.

Oats alſo grow very well in many of the fen countries, and in good ſeaſons bring great increaſe and advantage to the owners. There is alſo another vegetable of great profit to them. This is the *rapum ſilveſtre;* the ſeed of which they call *cole-ſeed;* and they make an oil from it of great uſe in trade. They grind the ſeed between two large ſtones, the one ſtanding perpendicularly on the other. The ſtones are made of a ſort of black marble, and are brought from Germany. They ſometimes turn them by ſails, and ſometimes by the drains which carry off the water from the fen lands.

The fens lying low, and being of a vaſt extent, are very ſubject to be overflowed by waters from the neighbouring high countries; and though great care and expence is uſed to keep them dry, they are often like a ſea; and the ſheep are obliged to be carried off in boats, and the people to live in their upper rooms, and to be ſupplied with proviſions alſo with boats.

FENCE, in gardening and huſbandry, a hedge, wall, ditch, bank, or other incloſure, made round gardens, fields, woods, &c.

In hot climates, where they have not occaſion for walls to ripen their fruit, their gardens lie open, where they can have a water-fence, and proſpects; or elſe they bound their gardens with groves, in which are fountains, walks, &c. which are much more pleaſing to the ſight than a dead wall: but, in colder countries, we are obliged to have walls to ſhelter and ripen our fruit, although they take away much from the pleaſant proſpect of the garden. Brick-walls are accounted the beſt and warmeſt for fruit: and theſe walls, being built pannelwiſe, with pillars at equal diſtances, will ſave a great deal of charge, in that the walls may be built thinner than if they were made plain without theſe pannels, for then it would be neceſſary to build them thicker every where; and, beſides, theſe pannels make the walls look the handſomer. Stone-walls, however, on account of their durability, are to be preferred to thoſe of brick, eſpecially thoſe of ſquare hewn ſtones, Thoſe that are made of rough ſtones, though they are very dry and warm, yet, by reaſon of their unevenneſs, are inconvenient to nail up trees to, except pieces of timber be laid in them here and there for that purpoſe.

But, in large gardens, it is better to have the proſpect open to the pleaſure-garden; which ſhould be ſurrounded with a foſſe, that from the garden the adjacent country may be viewed. But this muſt depend on the ſituation of the place: for, if the proſpect from the garden is not good, it had better be ſhut out from the ſight than be open. As alſo, when a garden lies near a populous town, and the adjoining grounds are open to the inhabitants; if the garden is open, there will be no walking there in good weather, without being expoſed to the view of all paſſengers, which is very diſagreeable.

Miller's Gardener's Dictionary.

Where the foſſes are made round a garden which is ſituated in a park, they are extremely proper; becauſe hereby the proſpect of the park will be obtained in the garden, which renders thoſe gardens much more agreeable than thoſe that are confined.—In the making theſe foſſes there have been many inventions; but, upon the whole, none ſeem preferable to thoſe which have an upright wall next the garden, which (where the ſoil will admit of a deep trench) ſhould be five or ſix feet high; and, from the foot of this wall, the ground on the outſide ſhould riſe with a gradual eaſy ſlope, to the diſtance of 18 or 20 feet; and where it can be allowed, if it ſlopes much farther it will be eaſier, and leſs perceptible as a ditch, to the eye, when viewed at a diſtance: but, if the ground is naturally wet, ſo as not to admit a deep foſſe, then, in order to make a fence againſt cattle, if the wall be four feet high, and ſlight poſts of three feet high are placed juſt behind the wall, with a ſmall chain carried on from poſt to poſt, no cattle or deer will ever attempt to jump againſt it; therefore it will be a ſecure fence againſt them; and if theſe are painted green, they will not be diſcerned at a diſtance, and at the ſame time the chain will ſecure perſons walking in the garden from tumbling over.

In places where there are no good proſpects to be obtained from a garden, it is common to make the incloſure of park-paleing; which, if well performed, will laſt many years, and has a much better appearance than a wall: and this pale may be hid from the ſight within, by plantations of ſhrubs and evergreens; or there may be a quick-hedge planted within the pale, which may be trained up, ſo as to be an excellent fence by the time the pales begin to decay.

Fences round parks, are generally of paleing; which if well made of winter-fallen oak, will laſt many years. But a principal thing to be obſerved, in making theſe pales, is not to make them too heavy; for, when they are ſo, their own weight will cauſe them to decay: therefore the pales ſhould be cleft thin; and the rails ſhould be cut triangular, to prevent the wet lodging upon them; and the poſts ſhould be good, and not placed too far aſunder. If theſe things are obſerved, one of theſe pales will laſt, with a little care, upwards of 40 years very well. The common way of making theſe fences is, to have every other pale nine or ten inches above the intermediate ones; ſo that the fence may be ſix feet and a half high, which is enough for fallow deer; but, where there are red deer, the fence ſhould be one foot higher, otherwiſe they will leap over.

Some incloſe their parks with brick walls; and, in countries where ſtone is cheap, the walls are built with this material; ſome with, and others without, mortar.

A kitchen-garden, if rightly contrived, will contain walling enough to afford a ſupply of ſuch fruits as require the aſſiſtance of walls, for any family; and this garden, being ſituated on one ſide, and quite out of ſight of the houſe, may be ſurrounded with walls, which will ſcreen the kitchen-garden from the ſight of perſons in the pleaſure-garden; and, being locked up, the fruit will be much better preſerved than it can be in the public garden; and the having too great a quantity of walling is often the occaſion that ſo many ill-managed trees are frequently to be ſeen in large gardens.

The height of garden walls ſhould be 12 feet, which is a moderate proportion; and, if the ſoil be good, it may in time be well furniſhed with bearing-wood in every part, eſpecially that part planted with pears, notwithſtanding of the branches being trained horizontally from the bottom of the walls.

With regard to the more common kinds of fences, Mr Anderſon gives the following directions, in his Eſſays on Agriculture, &c. "The fences that are moſt univerſally employed, are either ſtone-dikes or hedges (A). Dikes, if well built, as effectually preſerve a field from the intruſion of domeſtic animals, as any other kind of fence whatever; but they afford little warmth or ſhelter to the field: whereas hedges, if good, anſwer both theſe purpoſes equally well. But the moſt material diſtinction between dikes and hedges is, that dikes are in their higheſt degree of perfection as ſoon as they are reared, and from that moment begin to tend towards decay; ſo that the perſon who builds this kind of fence immediately receives the full benefit thereof: whereas hedges, being at firſt weak and tender, ſtand in need of attention and care, and do not become a fence for ſeveral years after they are planted; and, as they continue to increaſe in ſtrength, and gradually acquire a higher and higher degree of perfection, it is long before they begin to fall towards decay; ſo that they are, in general, infinitely more durable than dikes, altho' they are longer of becoming of uſe to the perſon who plants them. Which of theſe two kinds of fences may, upon the whole, be moſt eligible, muſt, in general, be determined by the circumſtances and views of the poſſeſſor of the ground to be incloſed. If he is a tenant who has a ſhort leaſe, without a proſpect of getting it renewed; or, if he has immediate occaſion for a complete fence; it will be, in general, moſt prudent in him to make choice of dikes, if the materials for rearing theſe are at hand: but, if there is any probability that his poſterity may reap any advantage from theſe incloſures, it will be almoſt always more for his advantage to make choice of hedges.

"A dike built of freeſtone and lime will be almoſt as durable as a hedge; although, in general, it will neither be ſo cheap nor agreeable. But dry-ſtone dikes, unleſs built of the fineſt quarried ſtone, are of ſuch a periſhable nature, as to be hardly ever worth the expence of rearing; and never, excepting where the field that you would wiſh to incloſe has plenty of ſtones upon its ſurface, which you are under a neceſſity of carrying away before the field can be improved. In this ſituation a man may, in ſome meaſure, be excuſed, if he ſhould be tempted to put them into dikes; becauſe the carriage of theſe ſtones may be ſaid to coſt him nothing; and he may, perhaps, be at ſome loſs how to diſpoſe of them in any other manner. But, in all other circumſtances, it is very bad œconomy to rear fences of this kind, as feal (B) dikes can always be built at one fourth of the expence that theſe would coſt—will anſwer all purpoſes equally well; and, if carefully built, will be kept in repair for any number of years at as ſmall an expence as they could be.

"The want of durability generally complained of in theſe dikes is owing to their bad conſtruction. The greateſt part of them are made of a conſiderable thickneſs, with a ditch on each ſide; the heart of the dike being made up with the earth that is taken from theſe ditches; and only a thin wall, on each ſide, is built of ſolid feal from top to bottom: the conſequence of which is, that as the looſe earth that is thrown into the middle of the dike ſubſides much more than the feal on each ſide, the top of the dike ſinks down; and, of courſe, the two ſide-walls are preſſed too much upon the inſide, ſo as to bilge (ſwell) out about the middle, and quickly crumble down to duſt. To avoid this inconvenience, I have always choſen to build my dikes of this ſort thinner than uſual: they being only three feet and a half thick at the bottom; one foot, or a very little more, at top; and five feet high: taking care to have them built in ſuch a manner, as that every ſod (feal), from top to bottom binds the joinings of the others below it, with as much accuracy as the bricks in a well-built wall. The uppermoſt courſe of feal is cut a little longer than thoſe that are immediately below it, and placed with the graſſy ſide uppermoſt, ſo as to project a little on each ſide; which not only helps to throw the water a little off the dike, but alſo to prevent ſheep or cattle from attempting to jump over it ſo readily

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(A) *Dike* is a term employed to denote any kind of wall reared for the purpoſe of incloſing a field and nothing elſe.

(B) *Feal* is a provincial word, which may perhaps have many ſynonyma. It here means any kind of ſod dug by the ſpade from the ſurface of graſs-ground, conſiſting of the upper mould rendered tough and coherent by the matted roots of the graſs thickly interwoven with it. If only a very thin bit of the upper ſurface is pared off with a paring ſpade, the pieces are here called *divots*. Theſe being of a firmer conſiſtence, are more durable when built into dikes than feal, but much more expenſive alſo.

Fence.

dily as they otherwiſe might do. At the foot of the dike, on each ſide, is dug a ſmall ditch, about a foot and a half or two feet deep; leaving a ledget of a few inches broad, on each ſide, that the dike may not be undermined by the crumbling down of the looſe earth into the ditch. Theſe ditches not only help to give the dike an additional height, and keep its foundation dry; but are alſo of uſe to prevent cattle from coming cloſe to it and rubbing upon it, or tearing it down with their horns, which they are very apt to do if this precaution be omitted. The earth that is taken out of the ditches may be thrown outwards into the place that was occupied by the feal that has been taken to build the dike; and, if the field is in graſs, a few ſeeds may be ſowed upon it, and it will ſoon be covered as well as the reſt of the field.

"By having the joints bound in every direction, the fabric is rendered much firmer than it could be by any irregular manner of working, while it is at the ſame time more eaſily reared. If the ground is ſoft, and the feal riſe well, I get a fence of this kind done for one penny halfpenny *per* yard; but, if it is not good to work, a little more than that muſt be allowed. As to the time that a fence of this kind may ſtand without needing any repair, I cannot ſpeak with certainty, as it is not long ſince I fell into this method of building them. The oldeſt has juſt now ſtood ten years, and ſeems to be nearly as firm as when firſt built. I have ſeen ſome walls of poor cottages which have been built ſomewhat after this manner, that have been good after ſtanding 40 or 50 years: but their durability depends greatly upon the nature of the feal of which they are formed. The beſt is that which is taken from poor ground of a ſpungy quality, which is generally covered with a ſtrong ſward of coarſe benty graſs. And, in ſituations where this can be had, I would have no heſitation in recommending this as the cheapeſt and beſt temporary fence that could be reared.

"The greateſt inconvenience that attends this ſpecies of fence, is the danger it runs of being torn down by the horns, or waſted away by the rubbing, of cattle upon it; which they will ſometimes do notwithſtanding of the ditches. This may be effectually prevented by planting a row of ſweet-briar (*eglantine*) plants between the firſt and ſecond courſe of feal when the dike is built, which will not fail to grow with luxuriance, and in a ſhort time defend the dike from every attack of this kind. But, if ſheep are to be kept in the incloſures, this plant ought not, on any account, to be employed; for, as that animal naturally flies to the fences for ſhelter in ſtormy weather, the prickles of the ſtraggling branches of the briar will catch hold of the wool, and tear it off in great quantities, to the great detriment of the flock and loſs of the proprietor. In theſe caſes, if the poſſeſſor of the ground is not afraid of the bad conſequences that may be dreaded from the ſpreading of whins (*furze*), it would be much better to ſcatter a few of the ſeeds of this plant along the ledget at the foot of the dike, which would quickly become a preſervative for it, and be otherwiſe of uſe as a green food for his ſheep during the winter ſeaſon. But, before he ventures to ſow this plant, let him remember, that where it is once eſtabliſhed, it will hardly fail to ſpread through the adjoining fields, and can hardly be ever afterwards throughly rooted out.

Fence.

"I have often imagined that this kind of fence might be greatly improved both in beauty and ſtrength, by planting a row of ivy plants beneath the firſt courſe of feal in building the dike; which would, in a ſhort time, climb up the ſides of the dike and cover the whole with a cloſe and beautiful network of woody fibres, covered with leaves of the moſt beautiful verdure; which would tend to preſerve the dike from being eat away by froſt, and other viciſſitudes of weather. And when it is arrived at the top, it would there ſend out a number of ſtrong woody branches, forming a ſort of hedge, that would afford ſome ſhelter to the fields, and break the force of the wind conſiderably; but, as I never have yet had an opportunity of trying the experiment, I only here offer it as a probable conjecture. I have ſeen a garden-wall that had been built of ſtone and clay, ornamented and ſtrengthened in this way. I have had the experience of ivy growing well upon a dry-ſtone dike: and have likewiſe ſeen it growing up the walls, and covering whole cottages built of feal; which have by this means been preſerved entire, long after the walls that had been naked have fallen to decay. But, not having had plants of this kind at hand, I have not had an opportunity of trying it in the manner propoſed; although, I think, there is the greateſt reaſon to hope for ſucceſs.

"Whins (*furze*) have been often employed as a fence when ſowed upon the top of a bank. They are attended with the convenience of coming very quickly to their perfection, and of growing upon a ſoil on which few other plants could be made to thrive: but, in the way that they are commonly employed, they are neither a ſtrong nor a laſting fence. The firſt of theſe defects may, in ſome meaſure, be removed, by making the bank upon which they are ſowed (for they never ſhould be tranſplanted) of a conſiderable breadth; in order that the largeneſs of the aggregate body, conſidered as one maſs, may in ſome meaſure make up for the want of ſtrength in each individual plant. With this view, a bank may be raiſed of five or ſix feet in breadth at the top, with a large ditch on each ſide of it; raiſing the bank as high as the earth taken from the ditches will permit; the ſurface of which ſhould be ſowed pretty thick with whin-ſeeds. Theſe will come up very quickly; and in two or three years will form a barrier that few animals will attempt to break thro', and will continue in that ſtate of perfection for ſome years. But the greateſt objection to this plant as a fence is, that, as it advances in ſize, the old prickles always die away; there being never more of theſe alive at any time upon the plant, than thoſe that have been the produce of the year immediately preceding: and theſe thus gradually falling away, leave the ſtems naked below as they advance in height; ſo that it very ſoon becomes an exceeding poor and unſightly fence; the ſtems being entirely bare, and ſo ſlender withal as not to be able to make a ſufficient reſiſtance to almoſt any animal whatever. To remedy this great defect, either of the two following methods may be adopted. The firſt is, to take care to keep the bank always ſtored with young plants; never allowing them to grow to ſuch a height as to become bare below: and it was principally to admit of this, without loſing at any time the uſe of the fence, that I have adviſed the bank to be made of ſuch an unuſual breadth. For, if one if well made of winter-fallen oak, will laſt many years. But a principal thing to be obſerved, in making theſe pales, is not to make them too heavy; for, when they are ſo, their own weight will cauſe them to decay: therefore the pales ſhould be cleft thin; and the rails ſhould be cut triangular, to prevent the wet lodging upon them; and the poſts ſhould be good, and not placed too far aſunder. If theſe things are obſerved, one of theſe pales will laſt, with a little care, upwards of 40 years very well. The common way of making theſe fences is, to have every other pale nine or ten inches above the intermediate ones; ſo that the fence may be ſix feet and a half high, which is enough for fallow deer; but, where there are red deer, the fence ſhould be one foot higher, otherwiſe they will leap over.

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With regard to the more common kinds of fences, Mr Anderſon gives the following directions, in his Eſſays on Agriculture, &c. "The fences that are moſt univerſally employed, are either ſtone-dikes or hedges (A). Dikes, if well built, as effectually preſerve a field from the intruſion of domeſtic animals, as any other kind of fence whatever; but they afford little warmth or ſhelter to the field: whereas hedges, if good, anſwer both theſe purpoſes equally well. But the moſt material diſtinction between dikes and hedges is, that dikes are in their higheſt degree of perfection as ſoon as they are reared, and from that moment begin to tend towards decay; ſo that the perſon who builds this kind of fence immediately receives the full benefit thereof: whereas hedges, being at firſt weak and tender, ſtand in need of attention and care, and do not become a fence for ſeveral years after they are planted; and, as they continue to increaſe in ſtrength, and gradually acquire a higher and higher degree of perfection, it is long before they begin to fall towards decay; ſo that they are, in general, infinitely more durable than dikes, altho' they are longer of becoming of uſe to the perſon who plants them. Which of theſe two kinds of fences may, upon the whole, be moſt eligible, muſt, in general, be determined by the circumſtances and views of the poſſeſſor of the ground to be incloſed. If he is a tenant who has a ſhort leaſe, without a proſpect of getting it renewed; or, if he has immediate occaſion for a complete fence; it will be, in general, moſt prudent in him to make choice of dikes, if the materials for rearing theſe are at hand: but, if there is any probability that his poſterity may reap any advantage from theſe incloſures, it will be almoſt always more for his advantage to make choice of hedges.

"A dike built of freeſtone and lime will be almoſt as durable as a hedge; although, in general, it will neither be ſo cheap nor agreeable. But dry-ſtone dikes, unleſs built of the fineſt quarried ſtone, are of ſuch a periſhable nature, as to be hardly ever worth the expence of rearing; and never, excepting where the field that you would wiſh to incloſe has plenty of ſtones upon its ſurface, which you are under a neceſſity of carrying away before the field can be improved. In this ſituation a man may, in ſome meaſure, be excuſed, if he ſhould be tempted to put them into dikes; becauſe the carriage of theſe ſtones may be ſaid to coſt him nothing; and he may, perhaps, be at ſome loſs how to diſpoſe of them in any other manner. But, in all other circumſtances, it is very bad œconomy to rear fences of this kind, as feal (B) dikes can always be built at one fourth of the expence that theſe would coſt—will anſwer all purpoſes equally well; and, if carefully built, will be kept in repair for any number of years at as ſmall an expence as they could be.

"The want of durability generally complained of in theſe dikes is owing to their bad conſtruction. The greateſt part of them are made of a conſiderable thickneſs, with a ditch on each ſide; the heart of the dike being made up with the earth that is taken from theſe ditches; and only a thin wall, on each ſide, is built of ſolid feal from top to bottom: the conſequence of which is, that as the looſe earth that is thrown into the middle of the dike ſubſides much more than the feal on each ſide, the top of the dike ſinks down; and, of courſe, the two ſide-walls are preſſed too much upon the inſide, ſo as to bilge (ſwell) out about the middle, and quickly crumble down to duſt. To avoid this inconvenience, I have always choſen to build my dikes of this ſort thinner than uſual: they being only three feet and a half thick at the bottom; one foot, or a very little more, at top; and five feet high: taking care to have them built in ſuch a manner, as that every ſod (feal), from top to bottom binds the joinings of the others below it, with as much accuracy as the bricks in a well-built wall. The uppermoſt courſe of feal is cut a little longer than thoſe that are immediately below it, and placed with the graſſy ſide uppermoſt, ſo as to project a little on each ſide; which not only helps to throw the water a little off the dike, but alſo to prevent ſheep or cattle from attempting to jump over it ſo readily

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(A) *Dike* is a term employed to denote any kind of wall reared for the purpoſe of incloſing a field and nothing elſe.

(B) *Feal* is a provincial word, which may perhaps have many ſynonyma. It here means any kind of ſod dug by the ſpade from the ſurface of graſs-ground, conſiſting of the upper mould rendered tough and coherent by the matted roots of the graſs thickly interwoven with it. If only a very thin bit of the upper ſurface is pared off with a paring ſpade, the pieces are here called *divots*. Theſe being of a firmer conſiſtence, are more durable when built into dikes than feal, but much more expenſive alſo.

dily as they otherwiſe might do. At the foot of the dike, on each ſide, is dug a ſmall ditch, about a foot and a half or two feet deep; leaving a ledget of a few inches broad, on each ſide, that the dike may not be undermined by the crumbling down of the looſe earth into the ditch. Theſe ditches not only help to give the dike an additional height, and keep its foundation dry; but are alſo of uſe to prevent cattle from coming cloſe to it and rubbing upon it, or tearing it down with their horns, which they are very apt to do if this precaution be omitted. The earth that is taken out of the ditches may be thrown outwards into the place that was occupied by the feal that has been taken to build the dike; and, if the field is in graſs, a few ſeeds may be ſowed upon it, and it will ſoon be covered as well as the reſt of the field.

“ By having the joints bound in every direction, the fabric is rendered much firmer than it could be by any irregular manner of working, while it is at the ſame time more eaſily reared. If the ground is ſoft, and the feal riſe well, I get a fence of this kind done for one penny halfpenny *per* yard; but, if it is not good to work, a little more than that muſt be allowed. As to the time that a fence of this kind may ſtand without needing any repair, I cannot ſpeak with certainty, as it is not long ſince I fell into this method of building them. The oldeſt has juſt now ſtood ten years, and ſeems to be nearly as firm as when firſt built. I have ſeen ſome walls of poor cottages which have been built ſomewhat after this manner, that have been good after ſtanding 40 or 50 years: but their durability depends greatly upon the nature of the feal of which they are formed. The beſt is that which is taken from poor ground of a ſpungy quality, which is generally covered with a ſtrong ſward of coarſe benty graſs. And, in ſituations where this can be had, I would have no heſitation in recommending this as the cheapeſt and beſt temporary fence that could be reared.

“ The greateſt inconvenience that attends this ſpecies of fence, is the danger it runs of being torn down by the horns, or waſted away by the rubbing, of cattle upon it; which they will ſometimes do notwithſtanding of the ditches. This may be effectually prevented by planting a row of ſweet-briar (*eglantine*) plants between the firſt and ſecond courſe of feal when the dike is built, which will not fail to grow with luxuriance, and in a ſhort time defend the dike from every attack of this kind. But, if ſheep are to be kept in the incloſures, this plant ought not, on any account, to be employed; for, as that animal naturally flies to the fences for ſhelter in ſtormy weather, the prickles of the ſtraggling branches of the briar will catch hold of the wool, and tear it off in great quantities, to the great detriment of the flock and loſs of the proprietor. In theſe caſes, if the poſſeſſor of the ground is not afraid of the bad conſequences that may be dreaded from the ſpreading of whins *(furze)*, it would be much better to ſcatter a few of the ſeeds of this plant along the ledget at the foot of the dike, which would quickly become a preſervative for it, and be otherwiſe of uſe as a green food for his ſheep during the winter ſeaſon. But, before he ventures to ſow this plant, let him remember, that where it is once eſtabliſhed, it will hardly fail to ſpread through the adjoining fields, and can hardly be ever afterwards throughly rooted out.

“ I have often imagined that this kind of fence might be greatly improved both in beauty and ſtrength, by planting a row of ivy plants beneath the firſt courſe of feal in building the dike; which would, in a ſhort time, climb up the ſides of the dike and cover the whole with a cloſe and beautiful network of woody fibres, covered with leaves of the moſt beautiful verdure; which would tend to preſerve the dike from being eat away by froſt, and other viciſſitudes of weather. And when it is arrived at the top, it would there ſend out a number of ſtrong woody branches, forming a ſort of hedge, that would afford ſome ſhelter to the fields, and break the force of the wind conſiderably; but, as I never have yet had an opportunity of trying the experiment, I only here offer it as a probable conjecture. I have ſeen a garden-wall that had been built of ſtone and clay, ornamented and ſtrengthened in this way. I have had the experience of ivy growing well upon a dry-ſtone dike: and have likewiſe ſeen it growing up the walls, and covering whole cottages built of feal; which have by this means been preſerved entire, long after the walls that had been naked have fallen to decay. But, not having had plants of this kind at hand, I have not had an opportunity of trying it in the manner propoſed; although, I think, there is the greateſt reaſon to hope for ſucceſs.

“ Whins *(furze)* have been often employed as a fence when ſowed upon the top of a bank. They are attended with the convenience of coming very quickly to their perfection, and of growing upon a ſoil on which few other plants could be made to thrive: but, in the way that they are commonly employed, they are neither a ſtrong nor a laſting fence. The firſt of theſe defects may, in ſome meaſure, be removed, by making the bank upon which they are ſowed (for they never ſhould be tranſplanted) of a conſiderable breadth; in order that the largeneſs of the aggregate body, conſidered as one maſs, may in ſome meaſure make up for the want of ſtrength in each individual plant. With this view, a bank may be raiſed of five or ſix feet in breadth at the top, with a large ditch on each ſide of it; raiſing the bank as high as the earth taken from the ditches will permit; the ſurface of which ſhould be ſowed pretty thick with whin-ſeeds. Theſe will come up very quickly; and in two or three years will form a barrier that few animals will attempt to break thro', and will continue in that ſtate of perfection for ſome years. But the greateſt objection to this plant as a fence is, that, as it advances in ſize, the old prickles always die away; there being never more of theſe alive at any time upon the plant, than thoſe that have been the produce of the year immediately preceding: and theſe thus gradually falling away, leave the ſtems naked below as they advance in height; ſo that it very ſoon becomes an exceeding poor and unſightly fence; the ſtems being entirely bare, and ſo ſlender withal as not to be able to make a ſufficient reſiſtance to almoſt any animal whatever. To remedy this great defect, either of the two following methods may be adopted. The firſt is, to take care to keep the bank always ſtored with young plants; never allowing them to grow to ſuch a height as to become bare below: and it was principally to admit of this, without loſing at any time the uſe of the fence, that I have adviſed the bank to be made of ſuch an unuſual breadth. For, if one ſide of the hedge be cut quite cloſe to the bank, when it is only two or three years old, the other half will remain as a fence till that ſide become ſtrong again; and then the oppoſite ſide may be cut down in its turn; and ſo on alternately as long as you may incline: by which means the bank will always have a ſtrong hedge upon it without ever becoming naked at the root. And as this plant, when bruiſed, is one of the moſt valuable kinds of winter-food yet known for all kinds of domeſtic animals *, the young tops may be carried home and employed for that purpoſe by the farmer; which will abundantly compenſate for the trouble of cutting, and the waſte of ground that is occaſioned by the breadth of the bank.

“ The other method of preſerving a hedge of whins from turning open below, can only be practiſed where ſheep are kept; but may be there employed with great propriety. In this caſe it will be proper to ſow the ſeeds upon a conical bank of earth, ſhoved up from the ſurface of the ground on each ſide without any ditches. If this is preſerved from the ſheep for two or three years at firſt, they may then be allowed free acceſs to it; and, as they can get up cloſe to the foot of the bank upon each ſide, if they have been accuſtomed to this kind of food, they will eat up all the young ſhoots that are within their reach, which will occaſion them to ſend out a great many lateral ſhoots; and theſe being continually browſed upon, ſoon become as cloſe as could be deſired, and are then in no ſort of danger of becoming naked at the root, although the middle part ſhould advance to a conſiderable height.

“ The fences hitherto mentioned are only intended to preſerve fields from the intruſion of cattle; but, on ſome occaſions, it is neceſſary to have a fence that would even reſiſt the efforts of men to break through it: as around bleaching-fields, orchyards, &c.; the want of which often ſubjects the proprietor of ſuch fields to very diſagreeable accidents. And, as ſuch a fence might, on ſome occaſions, be procured at no great expence or trouble, it were to be wiſhed that the method of doing this were more generally known than it is at preſent.—To effectuate this, it is neceſſary to begin by trenching up or ploughing a large belt all around the field you mean to incloſe, of 40 or 50 feet or more in breadth, if you find it convenient: the outer edge of which ſhould be incloſed by a good dike, or a ditch and hedge. This belt ſhould be kept in culture one year, and well manured, if your ſituation will admit of it; and laid up before winter in ſuch a manner that no water may be allowed to lodge upon it; and planted in the winter-time all over with plants of eglantine ſo thick as not to be above two feet from one another; and between theſe put a good number of young birch plants not above two years old, interſperſed with hazels, oak, aſh, rawn (wild ſervice), and other trees that you think will thrive upon your ſoil; together with thorns, hollies, brambles, and wood-bine (honeyſuckle): and having then fenced it from cattle, and kept down the weeds that may riſe upon its ſurface by the hoe, as long as you can conveniently get acceſs into it, leave it afterwards to nature. If this is done, and your ſoil be not extremely bad, the belt in a very few years will be entirely filled with a cloſe buſh of trees, ſo intermixed with the bending branches of the eglantine, and bound together by the trailing ſhoots of the bramble and woodbine, that no animal above the ſize of a cat could penetrate; eſpecially when it is of ſuch a depth as I have recommended.

“ The firſt hint that I got for a fence of this kind was from a ſmall thicket of bruſhwood that I had planted for ornament, pretty much in the manner above deſcribed; which in a ſhort time became ſo much interwoven with the ſweet-briar, that it was impoſſible to to find any acceſs into it. But as all kinds of trees and ſhrubs, if planted very cloſe upon one another, become naked at the root when they arrive at any conſiderable ſize, care ſhould be taken to prevent it from ever coming to that ſtate, by cutting it down whenever it becomes in danger of being open at the root. And as it would be improper ever to leave the field entirely defenceleſs, it is a great advantage to have the belt as broad as it conveniently may be, ſo that the one half of it may be a ſufficient fence; by which means, we will have it in our power to cut down the inſide and the outſide of the belt alternately, ſo as ſtill to keep the thicket young, and never to want at any time a ſufficient fence; and the bruſh-wood that this afforded at each cutting would, in almoſt every ſituation, yield ſuch a revenue as would do much more than indemnify the proprietor for the rent of the ground that was occupied by this fence. And if the field was in ſuch a ſituation as required ſhelter, ſome trees might be allowed to grow to their full ſize about the middle, without any inconvenience, if the belt were of a ſufficient breadth.

“ There is one other ſpecies of fencing as uſeful as any of thoſe already mentioned, which is in general much leſs underſtood, and more difficult to execute properly, that deſerves here to be taken notice of; *viz.* the method of ſecuring the banks of rivers from being waſhed away by the violence of the ſtream, and of preventing the damages that may otherwiſe be occaſioned by the ſwelling of the waters.

“ It frequently happens that, when a river runs in a bed of rich vegetable mould, the leaſt accident that may chance to divert the ſtream towards any particular part of the bank, cauſes it to ſweep away large tracts of fine ground, to the very great detriment of the proprietor, as well as the public; as this fine mould is uſually carried to the ſea, and the place that the water leaves to occupy the new bed that it thus forms for itſelf is generally of a much worſe quality; conſiſting chiefly of ſtones, ſand and gravel. In ſome caſes, where the whole force of the current is quite cloſe to the bank, and the materials neceſſary for fencing it are not to be found, it may perhaps be impoſſible or very difficult totally to prevent this evil; but, for the moſt part, it admits of a cure that can be obtained at a pretty moderate expence.

“ Theſe ravages are always greateſt where the bank riſes perpendicularly to a pretty conſiderable height above the ordinary ſurface of the water, and never at thoſe places where the banks ſhelve down gradually towards the water's edge: for, when the river is ſwelled to a great height by rains, and runs with a force and rapidity greater than uſual, it ſtrikes violently againſt theſe perpendicular banks that directly oppoſe its courſe, which being compoſed of earth quite bare and uncovered, are eaſily ſoftened by the water, and quickly waſhed away; ſo that the upper part of the bank being

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* See *Agriculture*, nº 46.

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being thus undermined, falls by its own weight into the river, and is carried off in prodigious quantities: whereas, at thoſe parts of the bank that ſhelve gradually downwards to the water's edge, when the river riſes to any conſiderable height, it gently glides along its ſurface; which being defended by the matted roots of the graſs with which it is covered, ſcarcely ſuſtains any damage at all; and is nearly the ſame after the water has retired within its banks as before the inundation. Theſe facts, which no one who has beſtowed the leaſt attention to this ſubject can fail to have obſerved, clearly point out, that the firſt and moſt neceſſary ſtep towards a cure, is to level down the edge of the bank that is next to the water, ſo as to make it ſlope gradually down towards the river. If the bank is very high, and you have no other particular uſe for the earth that muſt be taken from it, the eaſieſt method of diſpoſing of it, will be to throw it into the river: but, in whatever manner you may diſpoſe of the earth, the ſlope of the bank muſt be continued until the inner edge of it is as low as the ſurface of the water at the drieſt time of the year, and be made to aſcend gradually upwards from the water with an eaſy ſlope, till it comes to the level of the ground, or at leaſt riſes to ſuch a height as that the water never exceeds. This operation ought to be performed as early in ſummer as poſſible, and ſhould be either immediately covered with turf, pared from the ſurface of ſome field that has a very ſtrong ſward upon it; taking care to lay theſe in ſuch a manner as to be in as little danger as poſſible of being waſhed away by any accidental flood that might happen before they had grown together; or, if the turf of this kind cannot be eaſily had, it ſhould be ſowed very thick with the ſeeds of ſome ſmall matt-rooted graſs, that ſhould be kept in readineſs for this purpoſe (c).

"If the ſtream has not been extremely rapid at the foot of the bank, ſome of the earth that was thrown into the water will be allowed to ſubſide to the bottom, and will there form a bank of looſe ſoft earth, which will be of great uſe afterwards in preventing the face of the bank under water from being waſhed away; but, in order to ſecure this bulwark effectually for the future, the ſurface of this ſoft earth ought to be inſtantly ſtuck full of the roots of bog-reeds, flags, water-ſpiderwort, ruſhes, and other matt-rooted aquatic plants; which, if allowed to remain till they have once ſtruck root, will afterwards form a barrier that nothing will ever be able to deſtroy. But, if the ſtream be too rapid to admit of this, and the bank of ſoft earth is much deeper than the ſurface of the water, it will be of uſe to fill up the breaſt of the bank with looſe ſtones careleſsly thrown in, till they riſe near the ſurface of the water; which would moſt effectually ſecure it againſt any future encroachments, if the bank is ſloped away above.

"If it ſhould ſo happen that ſtones cannot be eaſily got for this purpoſe, the only reſource which in this caſe remains, is to dig the bank ſo low, that, at the undermoſt edge, it may be always below the ſurface of the water, and carry it out in this way for a conſiderable diſtance, and then ſtick the whole ſurface that is below the water full of matt-rooted aquatic plants; which will in a great meaſure, if not entirely, defend it from any future encroachments. This bank ought to continue to ſhelve downwards even where it was below water, and thoſe aquatics that will grow in the greateſt depth of water be planted on the innermoſt brink, and the others behind them. The water-ſpiderwort will grow in four feet depth of water, and the roots of the common yellow-flowered water-iris forms ſuch a ſtrong and compact covering upon the ſurface of the ſoil on which it grows, as would defend it from being affected by the water almoſt as well as if it were a rock: it is likewiſe an advantage attending this plant, that it grows upon a firm bottom, and chiefly delights in running water.

Fence, Fencing.

"If the ſtratum of ſoft earth is not ſo deep as to reach to the ſurface of the water, and lies upon a ſtratum of rock or hard gravel, there will be no occaſion for throwing in ſtones of any kind. But, as it is difficult to unite the vegetable mould to any of theſe ſtrata, there will alway be ſome danger of its ſeparating from theſe in violent inundations; and if the water once get an entry, it will not fail to grow larger and larger by every future inundation. To prevent this inconvenience, it will be neceſſary, after you have ſloped the earth away till you reach the gravel or rock, to cover the place where the edge of the earth joins the inferior ſtratum, with a good many ſmall ſtones, if they can be found; ſowing between them the ſeeds of any kind of plants that you think are moſt likely to thrive, which have ſtrong matted roots with as ſmall and flexible tops as poſſible. You will eaſily obſerve, that from the impoſſibility of ever making earth adhere firmly to ſtone of any kind, it muſt always be an improper practice to face the banks of a river to a certain height with ſtone, which is coped at top with earth."

For the moſt proper methods of raiſing hedges of different kinds, ſee HEDGE.

FENCE-*Month*, the month wherein deer begin to fawn, during which it is unlawful to hunt in the foreſt.

It commences 15 days before mid-ſummer, and ends 15 days, after it. This month, by ancient foreſters, is called *defence-month*.

FENCING, the art of making a proper uſe of the ſword, as well for attacking an enemy as for defending one's ſelf.

This art is acquired by practiſing with foils, called in Latin *rudes;* whence fencing is alſo denominated *gladiatura rudiaria*.—It is one of the exerciſes learnt in the academies, (ſee EXERCISE and ACADEMY); and is an accompliſhment both agreeable and uſeful:—Agreeable, as it affords gentlemen a noble and diſtinguiſhed amuſement:—Uſeful, as it forms their body; and furniſhes them with the faculty of defence, whether it be of their honour or their life, when the one or the other is attacked by thoſe turbulent and dangerous perſons whoſe correction is of ſervice to ſociety in general.

Pyrard aſſures us, that the art of fencing is ſo highly eſteemed in the Eaſt-Indies, that none but princes and noblemen are allowed to teach it. They wear a badge or cognizance on their right arms, called in their language *eſaru;* which is put on with great ceremony, like the badges of our orders of knighthood, by the kings themſelves.

(c) The creeping meadow-graſs, *poa repens*, is a proper graſs for this purpoſe.

Fencing is divided into two parts, *ſimple* and *compound.*

Simple is that performed directly and nimbly, on the ſame line; and is either offenſive or defenſive.—The principal object of the firſt, is whatever may be attempted, in puſhing or making paſſes, from this or that point, to the moſt uncovered part of the enemy. The ſecond conſiſts in parrying and repelling the thruſts aimed by the enemy.

The *compound* includes all the poſſible arts and inventions to deceive the enemy, and make him leave that part we have a deſign on bare and unguarded, upon finding we cannot come at it by force, nor by the agility of the ſimple play. The principal means hereof are, on the offenſive ſide, feints, appeals, claſhings, and entanglings of ſwords, half-thruſts, &c.; and, on the defenſive, to puſh in parrying. Of all which a detail would be here uſeleſs, as they are only to be underſtood and acquired from perſonal inſtructions conjoined with practice.

FENELON (Francis de Salignac de la Motte), was of an ancient and illuſtrious family, and born at the caſtle of Fenelon in Perigord in 1651. In 1689, he was appointed tutor to the dukes of Burgundy and Anjou; and in 1695 was conſecrated archbiſhop of Cambray. After this preferment, a ſtorm roſe againſt him, that obliged him to leave the court for ever, occaſioned by his performance intitled, *An explication of the maxims of the ſaints concerning the interior life;* in which he was ſuppoſed to favour the extravagant notions of Madam Guyon, and the principles of Quietiſm. A controverſy on this occaſion was for ſome time carried on between him and M. Boſſuet, biſhop of Meux: which terminated in an appeal to the pope; when his holineſs condemned the archbiſhop's book, by a brief dated March 12th, 1699. Some friends indeed pretend, that there was more of court-policy than religious zeal in this affair: but be this as it may, the archbiſhop ſubmitted patiently to this determination; and, retiring to his dioceſe of Cambray, acquitted himſelf punctually in all the duties of his ſtation, and led a moſt exemplary life. The work that gained him the greateſt reputation, and which will render his memory immortal, is his *Adventures of Telemachus;* the ſtyle of which is natural, the fictions well contrived, the moral ſublime, and the political maxims tending all to the happineſs of mankind. Hence it is thought, as the printing of this work was ſtopped at Paris, that the prelate's hereſy was in politics inſtead of religion; and though his diſgrace was prior to this work, he had, while he was tutor to the young princes, taught them the ſame principles aſſerted and exemplified in Telemachus. Fenelon died in 1715; and a collection of all his religious works was afterwards printed at Rotterdam, under the care of the marquis de Fenelon his grand-nephew, when ambaſſador to the States-General.

FENNEL, in botany. See ANETHUM.

FENTON (Sir Geoffrey), privy-counſellor and ſecretary in Ireland during the reigns of queen Elizabeth and king James I. is well known for his tranſlation of *Guicciardins's Hiſtory of the Wars of Italy,* dedicated to queen Elizabeth in 1579. He died at Dublin in 1608; after having married his daughter to Mr Boyle, afterward the great earl of Corke.

FENTON (Elijah), deſcended from an ancient family, was born at Shelton near Newcaſtle, but in what year is uncertain. He was the youngeſt of 12 children, and was intended for the miniſtry; but embracing principles contrary to the government, while at Cambridge, he became diſqualified for entering into holy orders. After he quitted the univerſity, he was ſecretary to the earl of Orrery; but ſeems to have ſpent the moſt of his life amongſt his friends and relations, and uſed to pay an annual viſit to his elder brother, who enjoyed an eſtate of 1000l. a-year. He was a man of great tenderneſs and humanity, enjoyed the faireſt reputation, and was much eſteemed by Mr Pope; who, when he died in 1730, paid him the tribute of a very elegant epitaph. He publiſhed a volume of poems in the year 1717; and, in 1723, was acted his tragedy of Mariamne, built upon her ſtory collected from Joſephus in the third volume of the Spectator.

FENUGREEK. See TRIGONELLA.

FEOD, or FEUD, is defined to be a right which a vaſſal hath in lands or ſome immoveable thing of his lord's, to uſe the ſame, and take the profits thereof hereditarily, rendering unto the lord ſuch feodal duties and ſervices as belong to military tenure, &c. and the property of the ſoil always remaining to the lord.

FEODAL, of or belonging to a FEUD or FEE.

FEODAL *Syſtem*, the conſtitution of FIEFS or FEUDS.

This remarkable ſyſtem, ſo univerſally received throughout Europe upwards of 12 centuries ago, that Sir Henry Spelman does not ſcruple to call it the law of nations in our weſtern world, forms a ſubject that merits particular attention; as, without a general knowledge of the nature and doctrine of feuds, it is impoſſible to underſtand, with any degree of accuracy, either the civil conſtitution of this kingdom, or the laws which regulate its landed property.

1 Origin of feuds.

The conſtitution of feuds had its original from the military policy of the northern or Celtic nations, the Goths, the Huns, the Franks, the Vandals, and the Lombards; who, all migrating from the ſame *officina gentium*, or "ſtorehouſe of nations," as it has been juſtly called, poured themſelves in vaſt multitudes into all the regions of Europe at the declenſion of the Roman empire. It was brought by them from their own countries, and continued in their reſpective colonies as the moſt likely means to ſecure their new acquiſitions: and, to that end, large diſtricts or parcels of land were allotted by the conquering general to the ſuperior officers of the army, and by them dealt out again in ſmaller parcels and allotments to the inferior officers and moſt deſerving ſoldiers. Theſe allotments were called *feoda*, "feuds," "fiefs," or "fees;" which appellation, in the northern languages, ſignifies a conditional ſtipend or reward (A). Rewards, or ſtipends, they evidently were: and the condition annexed to them was, that the poſſeſſors ſhould do ſervice faithfully,

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(A) Pontippodan, in his hiſtory of Norway (p. 290.) obſerves, that, in the northern languages, ODH ſignifies *proprietas*, and ALL *totum*. Hence he derives the ODHAL right in thoſe countries; and hence too, perhaps, is derived the *udal* right in Finland. (See Macdowal's Inſt. part 2.) Now, the tranſpoſition of theſe northern ſyllables, ALLODH, will give us the true etymology of the *allodium* or *abſolute property* of the feodiſts; as, by a ſimilar combination of the latter ſyllable with the word FEE (which ſignifies, as we have ſeen, a conditional reward or ſtipend), FEEODH, or *feodum*, will denote *ſtipendiary* property.

fully, both at home and in the wars, to him by whom they were given; for which purpoſe, he took the *juramentum fidelitatis*, or oath of fealty: (ſee the article *Feodal* TENURE): and in caſe of the breach of this condition and oath, by not performing the ſtipulated ſervice, or by deſerting the lord in battle, the lands were again to revert to him who granted them.

2
General nature of the feudal aſſociation.

Allotments, thus acquired, naturally engaged ſuch as accepted them to defend them: and as they all ſprang from the ſame right of conqueſt, no part could ſubſiſt independent of the whole; wherefore all givers as well as receivers were mutually bound to defend each other's poſſeſſions. But as that could not effectually be done in a tumultuous irregular way, government, and to that purpoſe ſubordination, was neceſſary. Every receiver of lands, or feudatory, was therefore bound, when called upon by his benefactor, or immediate lord of his feud or fee, to do all in his power to defend him. Such benefactor or lord was likewiſe ſubordinate to or under the command of his immediate benefactor or ſuperior; and ſo upwards to the prince or general himſelf. And the ſeveral lords were alſo reciprocally bound in their reſpective gradations, to protect the poſſeſſions they had given. Thus the feodal connection was eſtabliſhed; a proper military ſubjection was naturally introduced; and an army of feudatories were always ready enliſted, and mutually prepared to muſter, not only in defence of each man's own ſeveral property, but alſo in defence of the whole and of every part of this their newly acquired country: the prudence of which conſtitution was ſoon ſufficiently viſible in the ſtrength and ſpirit with which they maintained their conqueſts.

3
Of allodiality.

But while poſſeſſions were to flow in the range of feudality, and were to uphold a regular militia, there were alſo eſtates which were to be received and to be retained under more enlarged maxims. To theſe every perſon who was free had a title. He could lay claim to his lot or partition of territory, and could diſpoſe of it at his pleaſure (B). In contradiſtinction to the feodal grant, which, as we have ſeen, was burdened with ſervice and confined by limitation, theſe lands were known by the name of *allodiality;* a term which denoted their entire freedom and exemption from ſuperiority.

Stuart's *Obſerv. concerning the law and conſtitution of Scotland,* p. 17, &c.

We muſt not, however, imagine that theſe allodial proprietors had no ſhare in the defence of their country, or that the former were its only guardians. In the feudal times, the great conditions of ſociety were liberty and ſervitude. To be free, was to have a title to go to the wars, and to ſeek renown. To be a ſlave, was to be doomed to toil in the houſe, to ſweat in the field, and to know neither eaſe nor glory. While the ſubordinations of men in the arrangements of feudality were the peculiar guardians of the kingdom, there was yet, in every perſon who was free, an inherent obligation to defend it againſt uncommon and urgent dangers. The neceſſities of the ſtate gave the alarm to all the ranks of the citizens; and the brave made haſte to repel the enemy, and to ſpill their blood.—There were thus the militia of fiefs, and the militia of the nation.

4
National militia.

Of the free, it was a characteriſtic, that they might poſſeſs property; and while the train of the vaſſalage filled up the feudal army, the militia of the nation was neceſſarily to conſiſt of the proprietors of *allodiality*. But though, in general, an allodial poſſeſſion is to be applied to a property in land, it was likewiſe to denote an eſtate in moveables, or in money; and proprietors of the latter claſs, as well as thoſe of the former, were, in the ſeaſons of peril, to bear arms, and to range themſelves in battle.

5
Different ſituations of the feudatory and of the allodial proprietor.

But there was this diſtinction between the feudatories and the allodial proprietors, with regard to the circumſtance in queſtion, that the latter could only be called out in foreign wars, and againſt the enemies of the ſtate: as they held of no ſuperior or lord, they had no concern in private quarrels, and made no part in the feudal aſſociation. A circumſtance which, if judged by modern ideas, might appear advantageous. It was in fact, however, the reverſe; and operated as a cauſe of the converſion of *allodium* into *tenure*.

In the imperfection of government, when the magiſtrate could not extend his power with equal force over all the orders of men in the ſociety; while the weak were expoſed to the inſults and the paſſions of the ſtrong; while nobles, haughty and independent, could legally proſecute their reſentments with the ſword,

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(B) The curious reader may ſee the remote ſources of the feodal laws particularly traced in the manners of the Germanic tribes before they left their woods, by the learned and ſpirited author of *A view of Society in Europe*, Book I. chap. ii. ſect. I. The members of a German nation, according to Tacitus, cultivated, by turns, for its uſe, an extent of land coreſponding to their number; which was then parcelled out to individuals in proportion to their dignity. When a German tribe obtained poſſeſſion of a Roman province, they continued to be governed by their ancient principles in the diſtribution of their poſſeſſions. The king or ſovereign, as the perſon of greateſt dignity, had the moſt conſiderable portion; which came to conſtitute his *domain*. Each citizen and warrior had his lot or ſhare; which gave riſe to *allodiality*. That part of the territory which was not exhauſted by partitions to individuals, was conſidered, agreeably to the ancient ideas, as belonging to the community; and was called, in the barbaric codes, the lands of the *fiſc*. The ſituation of a German ſtate, which had acquired a ſettlement, produced the neceſſity of drawing cloſer the connection of the ſovereign and the chiefs, and of the chiefs and the people. The lands of the *fiſc* were the medium which was employed in effecting this deſign. The ſovereign took the direction of theſe: hence poſſeſſions flowed to the chiefs, under the burden of preſenting themſelves in arms at the call of the ſovereign; hence the chiefs dealt out lands to their retainers, under the like injunction of continuing to them their aid; and thus a political ſyſtem was founded, which was to act in ſociety with infinite efficacy.

"Of this ſyſtem (ſays Dr Stuart) the intention and the ſpirit were national defence and domeſtic independence. While it called out the inhabitant and the citizen to defend his property, and to ſecure his tranquillity, it oppoſed barriers to deſpotiſm. Growing out of liberty, it was to promote the freedom of the ſubject. The power of the ſovereign was checked by the chiefs, who were to form a regular order of nobility; and the ariſtocracy, or the power of the chiefs, was repreſſed by the retainers and vaſſals, who, conſtituting their greatneſs, were to attract their attention. The chief who oppreſſed his retainers, was to deſtroy his own importance. It was their number, and their attachment, which made him formidable to his prince and to his equals."

Stuart's View of Society in Europe, p. 41, &c.

ſword, revenge their wrongs, and gratify their avarice and cruelty, the holders of fiefs enjoyed a ſupreme advantage over allodial proprietors. A lord and his retainers, connected together in an intimate alliance, following the ſame ſtandard, and adopting the ſame paſſions, could act with concert and efficacy. But allodial proprietors were altogether diſqualified to defend themſelves. Being diſtant and diſengaged, they could form and ſupport no continued or powerful confederacy; and the laws, in fact, did not permit them to enter into factions and hoſtilities. The violence of the times created an abſurdity. It gave to gifts under ſervice and revertible to the grantor, a value ſuperior to lands which were held in full property and at the diſpoſal of the proprietor. It made neceſſary the converſion of *propriety* into *tenure*.

Nor was this the only conſideration which had weight with the poſſeſſors of property. In every monarchy, but in one more particularly that is governed by feudal ideas, rank and pre-eminence attract chiefly the attention, and excite the ambition of individuals. The king being the fountain of honour, and diſtinctions flowing from his favour, the ranks of men were nicely adjuſted; and in proportion as they approached to his perſon, they exacted and received reſpect. From this principle it naturally proceeded, that allodial proprietors were treated with contempt. Holding by no tenure, and occupying no place in the feudal arrangements, they could not draw obſervation. Their pride was alarmed, and they wiſhed for the reſpect and ſecurity of vaſſals.

6 Converſion of allodium into tenure.

Princes, bent on the extenſion of fiefs, diſcouraged theſe proprietors. Their ambition, their abilities, and their prerogatives, furniſhed them with the greateſt influence; and they employed it to give univerſality to a ſyſtem, which was calculated to ſupport the royal dignity and the national importance. Compoſitions for offences inferior to thoſe which were allowed to a vaſſal, were deemed ſufficient for the proprietors of allodiality. In the courts of juſtice, they felt the diſadvantages of their condition. Mortified with regal neglect; without ſufficient protection from the laws; expoſed to the capricious inſolence, and the deſtructive ravages, of the great; diſguſted with rudeneſs, contempt, and indignity, they were driven into the circle of fiefs. They courted the privileges and protection which were enjoyed by vaſſals. They ſubmitted their eſtates to tenure, ſelecting to themſelves a ſuperior the moſt agreeable, granting to him their lands, and receiving them back from him as a feudal donation.

In this direction of affairs, the extenſion of the feudal inſtitutions was unavoidable. The landed property was every where changed into feudality. The empire of fiefs was univerſal (c).

While the greatneſs and ſimplicity of thoſe maxims which the conquerors of Rome brought with them from their woods continued to animate their poſterity, the feudal aſſociation was noble in its principles, and uſeful in its practice. It was an exerciſe of bounty on the part of the lord, of gratitude on that of the vaſſal. On the foundation of their connection, and of that of the land or fief which the former beſtowed on the latter, a train of incidents was to ariſe, the unequivocal expreſſions of friendſhip and habitude, the tender and affectionate fruits of an intercourſe the moſt devoted and zealous.

(c) It has puzzled the learned to diſcover the nation of the barbarians which firſt gave a beginning to fiefs. No inquiry, in Dr Stuart's opinion, could be more frivolous. In all of them they muſt have appeared about the ſame period. And they prevailed in all of them in conſequence of the ſimilarity of their ſituation on their conqueſts, and in conſequence of their being governed by the ſame cuſtoms. It is not, therefore, to the principle of imitation that their univerſality is to be aſcribed.

The annals of France make mention of fiefs in the age of Childebert. The Longobards at an early period introduced them into Italy; and the cuſtoms and laws which relate to them ſeem to have advanced rapidly among this people *.

In Spain, the introduction of feudal tenures preceded the devaſtations of the Saracens or Moors, which began in the year 710. Among the Goths, who eſtabliſhed the monarchy of Spain, lands were granted for ſervice and attachment; and the receiver was the retainer of the granter. He was ſaid to be *in patrocinio*; and if he refuſed his ſervice, he forfeited his grant. It alſo appears, that the retainer, or vaſſal, ſwore fealty to his patron or lord. And it was on this ſcheme that their militia was regulated †.

In England, there is little doubt that the feudal law was known in the Saxon times, as we ſhall ſee above §.

In Scotland, the hiſtory of fiefs is ſtill more obſcure than in any other nation. This imperfection has been aſcribed partly to the melancholy condition of the Scottiſh records, but chiefly to the want of able antiquaries of that nation. But, according to Dr Stuart ‡, "the two great diviſions of landed property, *feudality* and *allodial poſſeſſion*, were coeval with its monarchy. And they muſt have ſprung from the ſame peculiarity of manners, and of ſituation, which had given them exiſtence in other nations. It has been conceived, indeed, that Malcom II. building upon ſome foreign model, introduced theſe cuſtoms into Scotland; and the great body of the Scottiſh hiſtorians and lawyers have ſubſcribed to this notion. It has likewiſe been thought, that they were imported thither expreſsly from England; and the policy of Malcolm III. has been highly extolled as the effective cauſe of their eſtabliſhment. But it ſeems to Dr Stuart, that no reaſons of any authority ſupport theſe opinions.

"They bear either expreſsly, or by implication, that the feudal ſyſtem was introduced into Scotland, in conſequence of a principle of adoption or imitation. Now, the peculiarities of fiefs are ſo ſtrong, and ſo contradictory to all the common maxims which govern men, that they could not poſſibly be carried, in any ſtage of their progreſſion, from one people to another. To tranſplant the feudal uſages, when the grants of land were precarious, or at the will of the prince, to a country where ſuperiority and vaſſalage had been unknown; to alter the orders of men, from the ſovereign to the peaſant; and to produce the correſponding chain of cuſtoms, with reſpect to legiſlation, and the details of the higher and the lower juriſdiction, muſt have been an attempt infinitely wild, and altogether impracticable. To tranſplant fiefs in their condition of perpetuity, muſt have been a project, involving an equal, or rather a greater, number of abſurdities.

"But, while it is to be imagined, that fiefs could not be tranſported with ſucceſs, in any period of their progreſſion, from one people to another; it is alſo obvious, that a nation ſo cultivated, as to have the knowledge and the practice of them in any degree, could not be inclined to make a conqueſt for the purpoſe of a ſettlement. The exiſtence of fiefs implies an eſtabliſhment and a fixed reſidence; and hiſtory has no notice of any tribe or people under this deſcription, who ever wandered from home to fight for a tract of country which they might inhabit.

"Wherever feudality was to flouriſh, it was to grow from the root. The tree could not be carried to a foreign ſoil. Its native earth could alone preſerve it in exiſtence, and give the aliment that was to make it riſe into height, and ſhoot into branches.

"Scotland was a feudal kingdom; and we can point pretty exactly to the time when fiefs were *hereditary* there. Now,

* *Giannone Hiſtory of Naples*, book iv. ſect. 3.

† *LL. Wiſigoth*, lib. v. tit. 3. lib. iv. tit. 7. l. xx.

§ *Vid.* alſo *Whittaker's hiſtory of Mancheſter.*

‡ *Obſerv. on the law and conſtitution of Scotland.* p. 2,—12.

7 The feodal incidents.

While the grants of lands were precarious, or for life, the ſuperior choſe to educate, in his hall, the expectants of his fiefs. And, when they deſcended to heirs, he was careful, on the death of his vaſſal, to take the charge of his ſon and his eſtate. He protected his perſon, directed his education, and watched over his concerns. He felt a pride in obſerving his approaches to manhood, and delivered to him, on his majority, the lands of his anceſtor, which he had been ſtudious to improve. Theſe cares were expreſſed in the incident of *wardſhip*.

The vaſſal, on entering to his fief, conſcious of gratitude, and won with the attention of his lord, made him a preſent. This acknowledgment, ſo natural, and ſo commendable, produced the incident of *relief*.

Grateful for the paſt, and anxious for the future favour of his chief, the vaſſal did not incline to ally himſelf with a family which was hoſtile to him. The chief was ambitious to add to his power and ſplendor, by conſulting the advantageous alliance of his vaſſal. They joined in finding out the lady whoſe charms and whoſe connections might accord with the paſſions of the one and the policy of the other. This attention gave eſtabliſhment to the incident of *marriage*.

When the ſuperior was reduced to diſtreſs and captivity in the courſe of public or of private wars, when he was in embarraſſment from prodigality or waſte, when he required an augmentation of means to ſupport his grandeur, or to advance his ſchemes and ambition, the vaſſal was forward to relieve and aſſiſt him by the communication of his wealth. On this foundation there grew the incident of *aid*.

When the vaſſal gave way to violence or diſorder, or when by cowardice, treachery, or any ſtriking delinquence, he rendered himſelf unworthy of his fief, the ſacred ties which bound him to his lord were infringed. It was neceſſary to deprive him of his land, and give it to a more honourable holder. This was the origin of the incident of *eſcheat*.

8 appineſs f the feo- al aſſocia- on.

Amidſt the contention of friendſhip and the mutuality of mind which informed the lord and his vaſſal, there was experienced a condition of activity, liberty, and happineſs. The vaſſals attended to the retainers who were immediately below them. In their turn, they were courted by the lords, whoſe ſtrength they conſtituted. And the lords gave importance to the ſovereign. A ſubordination was known, which was regular, compact, and powerful. The conſtituent parts intereſted in government as well as war, were attentive, in their ſeveral departments, to the purpoſes of order and juſtice; and, in national operations, they acted with an uniformity which made them formidable. Of this aſſociation public liberty was the reſult. And, while this fortunate ſtate of things continued, the people, in every country of Europe, came in arms to their national aſſembly, or appeared in it by their repreſentatives.

Such, in a more particular manner, was the condition of the Anglo-Saxon period of our hiſtory; and the people, happy alike in their individual and politic capacity, as men and as citizens, were to bear more reluctantly the oppreſſions of the Normans.

9 Its declenſion.

Ibid. p. 75.

But the original manners which the conquerors of the Romans brought from their foreſts, were to ſpend their force. The high ſentiments which had reſulted from the limited ideas of property, were to decay. The generous maxims of the feudal aſſociation, and the diſintereſted wildneſs of chivalry †, were to ſuffer with time. Property was unfolded in all its relations, and in all its uſes. It became a diſtinction more powerful than merit, and was to alter the condition of ſociety. By ſeparating the intereſts of the lord and the vaſſal, it was to deſtroy for ever the principles of their aſſociation; and the *incidents*, which, in a better age, had foſtered their friendſhip, were to feed their rage, and to prolong their animoſity. As their confederacy had been attended with advantages and glory, their diſaffection was marked with debaſement and ſubjection. Out of the ſweets of love, a fatal bitterneſs was engendered. Sufferance was to ſucceed to enjoyment; oppreſſion to freedom. Society and government were to be tumultuous and diſorderly; and diſeaſes and infirmities were to threaten their decay.

10 The perverſion of its incidents.

In the prevalence of property and of mercenary views, the *ward* of the infant-vaſſal, which the ſuperior once conſidered as a ſacred care and an honourable truſt, was to be regarded in no other light than as a lucrative emolument. The acquiſitions of the vaſſal, which, in their ſtate of agreement and cordiality, were a ſtrength to the lord, ſeemed now to detract from his domains. He committed ſpoil on the eſtate which, of old, it was his pride to improve. He neglected the education of the heir. He gave repeated inſults to his perſon. The relations of the vaſſal were often to buy from the ſuperior the cuſtody of his perſon and his lands. This right was more frequently to be let out to exerciſe the rapacity of ſtrangers. The treaſury of princes was to increaſe with this traffic; and ſubject-ſuperiors were to imitate, as well from neceſſity as from choice, the example of princes. The heir, on his joyleſs majority, received the lands of his anceſtor; and, while he ſurveyed, with a melancholy eye, his caſtles, which bore the marks of neglect, and his fields, which were deformed with waſte, new grievances were

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† See *Chivalry* and *Knight*.

Now, in that form, they could not be imported by any of its princes; and, it is evident, that no conquering nation, advanced to the practice of fiefs in this degree, made a conqueſt and eſtabliſhment in Scotland. In conſequence, therefore, of a *natural* progreſs, fiefs muſt have grown to this condition of refinement. And, before fiefs were hereditary, they were for a ſeries of years; before they were for a ſeries of years, they were for life; and, before they were for life, they had been precarious or at pleaſure.

“In every feudal country, the progreſs from the precarious grant, to the gift in perpetuity, was experienced. In Scotland, the ſame progreſs muſt have been known; and the conſideration of it carries us back to a remote antiquity. For fiefs, in this kingdom, being *hereditary* about the days of Malcolm II. or Malcolm III. ſome centuries muſt have paſſed away in the production of the previous ſteps of feudality.”

to embitter his complaints, and to ſwell his paſſions.

11 Oppreſſed ſituation of vaſſals.

The *relief*, which originally was no more than a preſent, at the pleaſure of the vaſſal, on his entering into the fief, was conſolidated into a right. An expreſſion of gratitude was converted into a debt and a burden. The ſuperior, before he inveſted the heir in his land, made an exaction from him, in which he had no rule but his rapacity. His demand was exorbitant and grievous. And, if the heir delayed too long to extinguiſh this fine of redemption, or was unable to pay it, the ſuperior continued his poſſeſſion of the eſtate. Rigours, ſo humiliating, and ſo frantic, produced clamour, diſcontent, and outrage. Mitigations were to be applied to them, and to prove ineffectual. Laws were to be made againſt them, and to be diſregarded.

The *marriage* of the vaſſal, which could not be abuſed while their aſſociation was firm and their intereſt mutual, became a moſt ruinous perquiſite, when their aſſociation was broken, and their intereſt diſcordant. The ſuperior could give his vaſſal in marriage to whom he pleaſed. This right he exerted as a property. It might be purchaſed from him by the vaſſal himſelf, or by a ſtranger. The marriage of the vaſſal, without the conſent of the ſuperior, involved the forfeiture of the eſtate, or was puniſhed with oppreſſive penalties. It was a rule, indeed, reſulting out of their former habitudes, that the heir ſhould not be married to his diſparagement. But this rule was overlooked amidſt the violence of the times. The ſuperior had no check but from his humanity, the vaſſal no relief but in remonſtrance.

This right, ſo mortifying to the male heir, was a ſtretch of ſtill wilder oppreſſion, and more ferocious cruelty, when exerciſed on the *female ward.* Her hand might be tendered at the will of the ſuperior. He might pay no attention to her affections. She was to ſubmit, at his mandate, to indecent embraces, unſanctioned with love. Her beauty was to loſe its ſweets, and her heart its enjoyments, to feed his avarice, and to gratify his whim. Her relations were often to buy from him a privilege ſo frightful; and the unfeeling tyrant was to paint the horrors of its exertion, to extort his demand.

The *aid* which, in happier times, the vaſſal beſtowed out of benevolence to relieve the diſtreſs and to aſſiſt the grandeur of his lord, became a burden and a tax in the miſery of their diſaffection. It was arrogated as a duty and a tax. The lord called for an aid or contribution, when his eldeſt daughter was married, when his eldeſt ſon was made a knight, and when, having been taken in war, his own perſon was to be ranſomed. Theſe were eſteemed the legal occaſions when exactions could be made. But cuſtom and practice authoriſed the requiſition of aids on pretences the moſt frivolous. When the crown or the lord was diſpoſed to be oppreſſive, they could find a reaſon for an *aid;* and wants, not his own, were to affect every moment the ſubſtance of the vaſſal.

While their confederacy was maintained, it was not on any ſlight foundation that the fief could be taken from the vaſſal. Cowardice, diſhonour, treachery, or treaſon, were then the cauſes of *eſcheat.* The lord was not to be ſo offended with leſſer delinquencies, as to take poſſeſſion of the eſtate. In the times, however, of their diſagreement, the cauſes of forfeiture were to multiply, and he was to be active to enforce them. Treſpaſſes and trifles were to be ſufficient grounds for the ſeiſure of lands, of which the poſſeſſor was offenſive. The vaſſal held a precarious and dangerous territory; and, with a mind diſpoſed to be hoſtile to his chief, was to obſerve to him an attentive and punctilious demeanour. If he refuſed too long to attend the court of the ſuperior, and to give his oath of fidelity; if he happened to commit the ſlighteſt infringement of his oath; if he foreſaw any misfortune that was to befal his lord, and neglected to inform him of it; if, by any act, he was to affect the credit or the reputation of his ſuperior; if he ſhould chance to reveal any private circumſtance concerning him; if he ſhould grant an infeudation in any other form than that in which he held his own; if he ſhould make love to the wife or the daughter of his lord, or ſhould careſs his ſiſter, while yet a virgin and unmarried; theſe, and reaſons ſtill more abſurd, were to forfeit the eſtate to the ſuperior, and to involve the ruin of the vaſſal and that of his family.

12 Conſequent degeneracy of the feudal militia.

But though the cordiality of the lord and the vaſſal was decayed, the grant of land from the former to the latter continued its obligations. The vaſſal was held by a tie, which he could not renounce without forſaking his importance. His property and ſubſiſtence faſtened him to an enemy. His paſſions and his duties were at variance. He might hate the perſon of his lord, but he was to bow to him as his ſuperior. The grant of land he enjoyed, bound him to the performance of military ſervice. With a cold heart, he was to buckle himſelf in his armour; and, with reluctant ſteps, he was to follow the march of his chief. Of old, it had been his fondeſt attention to carry all his ſtrength againſt an enemy, that he might diſplay his own greatneſs, and add to the magnificence of his ſuperior. He now furniſhed unwillingly the leaſt aſſiſtance in his power. The fervour of his former conduct was never more to advance the meaſures of ambition. And, in this ſtate of things, the feudal militia was to obſtruct and retard, rather than to forward, the operations of princes.

In the heart of a populous kingdom, and ſurrounded with ſubjects accuſtomed to arms, the feudal ſovereign was thus to feel an unnatural weakneſs. A malady, ſo formidable, could not but produce an anxiety for its cure. And, what is no leſs certain than peculiar, in the different countries of Europe the ſame remedy was applied to it.

Fiefs, or the grants of land under military ſervice, had advanced from being annual to be for life; and, from being donations for life, they were to proceed to be hereditary. It was before the eſtabliſhment of this ultimate point in their progreſſion, that the happineſs of the feudal aſſociation was diſturbed. And, it was the eſtabliſhment of this point which was to afford the opportunity to princes of recovering, in ſome degree, their greatneſs. While the cordiality of the vaſſal was maintained, a *general* obligation of military ſervice was ſufficient to induce him to marſhal all his force in the field. When this cordiality was deſtroyed, policy was to extort what his generoſity and attachment had conferred. Lands were to be burdened with a *full* and exact proportion of ſoldiers. The giving them out in perpetuity was the ſeaſon for annexing this burden. An expedient, natural, and not to be oppoſed, ſuggeſted

13 Expedient for its recovery.

geſted itſelf. The tenure of *knight-ſervice* was invented.

14
Invention of knight-ſervice.

A portion of land, of which the grant, by the agreement of the giver and the receiver, entitled to the ſervice of a ſoldier or a knight, was a *knight's fee*. An eſtate, of 200 fees, furniſhed, of conſequence, 200 knights. Manours, baronies, and earldoms, were thus powerful, in proportion to their extenſiveneſs. The grants from the ſovereign to the nobles claimed the ſervice of ſo many knights; and the ſub-infeudations of the nobles enabled them to perform this ſervice. The tenants of the crown who were not noble, had alſo their fees, and furniſhed proportionally their knights. Grants *in capite*, or from the ſovereign, and the ſub-infeudations of vaſſals, called out the force of the kingdom. The prince, the nobility, and the people, were in the capacities of a general, officers, and ſoldiers. A call to arms put the nation into motion. An army, numerous and powerful, could be aſſembled with expedition, exact in its arrangements, and in a ſtate for defence and hoſtility.

Such, Dr Stuart conceives, was the origin and nature of KNIGHT-*ſervice*: A tenure which came to recover the feudal militia at a time when it was periſhing in weakneſs. But though it bound more cloſely, in the connection of land, the ſuperior and the vaſſal, by the fixedneſs of the ſervice it enjoined, it could not bring back their ancient cordiality. It gave a ſtrength and conſiſtency to the military department of the feudal inſtitutions; but it removed none of their civil inconveniencies and burdens. Theſe, on the contrary, were to increaſe during its prevalence. It was to brace, only, with a temporary vigour, a ſyſtem which no prudence or art could accommodate to refining manners.

The *incidents*, which had grown with the progreſs of fiefs, ſtill continued their operation. Every grant by the tenure of knight-ſervice, was attended with homage and fealty, and was expoſed to wardſhip and relief, to marriage, aid, and eſcheat. The ſuperior had ſtill his pretenſions and his claims; the vaſſal was ſtill to ſuffer and to complain. Promiſes of the relaxation of the feudal perquiſites, were to be made by princes, and to be forgotten. Legal ſolemnities of reſtraint were to be held out, and, occaſionally, to produce their effect. But, palliatives, feeble or forced, were not to controul the ſpirit of the ſyſtem and the times. Fiefs, while they ſuſtained, in the tenure of knight-ſervice, the grandeur of the European ſtates, were waſting with internal debilities. And the eye, in ſurveying their ſtrength and magnificence, can trace the marks of an approaching weakneſs and decline.

15
Two æras in the hiſtory of fiefs.

Thus, in the hiſtory of the feudal inſtitutions, there are two remarkable periods; the epoch which preceded the invention of knight-ſervice (D), and the epoch during which it prevailed.

From the conqueſts of the barbarians till the ninth century, fiefs were in their ſtate of fluctuation. It was about the year 877 that the perpetuity of the fief was eſtabliſhed in France; and it was known in every country of Europe, in the commencement of the tenth.

16
Doubts concerning the introduction of the feodal laws into England, &c.

The tenure of knight-ſervice ſoon followed the perpetuity of the fief, and was connected with it. There is an inſtance of a knight-fee in the 880 *. In the reign of Hugh Capet, who was raiſed to the throne in the year 987, this tenure extended itſelf over France; and after having appeared in other nations, it was introduced into England (E). But, in this laſt country, there are peculiarities, concerning the beginnings and the progreſs of fiefs, which have been the ſubject of much inquiry and conjecture. Many learned writers are poſitive that the Anglo-Saxons were ſtrangers to fiefs, which they aſſert were introduced into England by William duke of Normandy. There are writers not leſs learned who affirm, that fiefs were not introduced into England by the duke of Normandy, but prevailed among the Anglo-Saxons in the condition in which they were known under William. Dr Stuart † obſerves, that it cannot be true, that the Saxons who ſettled in England ſhould be ſtrangers to fiefs.——The hereditary grant of land, as well as the grant in its preceding fluctuations, was known to our Saxon anceſtors. Of this, the conformity of manners which muſt neceſſarily have prevailed between the Saxons and all the other tribes of the barbarians, is a moſt powerful and a ſatisfactory argument. Nor is it ſingle and unſupported. Hiſtory and law come in aid to analogy; and theſe things are proved by the ſpirit and text of the Anglo-Saxon laws, and by actual grants of hereditary eſtates under military ſervice (F).

* *Ducange*, voce *Militia*.

† *View of Society*, p. 97.

(D) For the difference between the knights produced by this ſervice and the more ancient knights or knights of honour, ſee the word KNIGHT.

(E) Knight-ſervice was eſtabliſhed in Scotland before the time of Malcolm IV. *anno* 1153. Records of his reign inſtruct its exiſtence, and do not mention it as a novelty. It even appears probable that this tenure was known in the times of David I. See *Dr Stuart's Obſerv. on the Law and Conſtit. Hiſt. of Scotland*, p. 16. and 156—160.

(F) The uſe of entails, which was not unknown in the Anglo-Saxon times, and the ſucceſſion which obtained in allodial eſtates, muſt have contributed very much to the eſtabliſhment of the perpetuity of the fief; *LL. Ælfredi*, ap. *Wilkins*. The general tendency of the fief to this ultimate ſtep, and the immenſe power of many of the Anglo-Saxon nobles, ſeem alſo to confirm the idea, that the exiſtence of its perpetuity might, in ſome caſes, be known in the Anglo-Saxon times. But preſumptive arguments, though of great weight, are not to be entirely relied upon in queſtions of this ſort.

There is actual evidence that Ethelred poſſeſſed, as an hereditary fief and earldom, the territory which had conſtituted the kingdom of Mercland. He had this grant from king Alfred, when he married his daughter Ethelfleda; *Selden, Tit. Hon.* part 2. ch. 5. It is teſtified out of records, that the earldom of Leiceſter was an inheritance in the days of Ethelbald; and the regular ſucceſſion of its earls, for a long period, is to be pointed out: *Camden's Britannia, by Gibſon*, vol. I. p. 542. It is known from old hiſtorians of credit, that Deireland and Bernicia were Saxon earldoms, which were not only feudal, but inheritable; *Tit. Hon.* part 2. ch. 5.

The grant of Cumberland by king Edmund to Malcom king of Scotland, was alſo feudal and inheritable; and this appears from the Saxon Chronicle, and from the following verſion of the terms employed in it. "Eadmundus Rex totam Cumberland prædavit et contrivit, et *commendavit* eam Malcolmo Regi Scotiæ, hoc pacto quod *in auxilio* ſibi foret terra et mari. *H. Huntindon, ap. Præfat. Epiſc. Derrenſ. ad LL. Anglo-Sax.* p. 7. The expreſſion *com-*

But although fiefs prevailed in the Anglo-Saxon times, yet their condition was different then, from what it afterwards became. Under the Anglo-Saxon princes, no mention is made of thoſe feudal ſeverities which ſhook the throne under William and his ſucceſſors. The varying ſpirit of the feudal aſſociation, which Dr Stuart has been careful to remark, accounts for this difference. When the connection between the ſuperior and vaſſal was warm and generous, the feudal incidents were acts of cordiality and affection. When the introduction of luxury, and an acquaintance with the uſe of riches, had given birth to thoſe intereſted paſſions which ſet the ſuperior and vaſſal at variance, the ſame incidents became acts of oppreſſion and ſeverity. This was more remarkably the caſe under William and his immediate ſucceſſors; and untill the time of king John, the people of England complained loudly of the feudal ſeverities, and to their complaints always joined the requeſt, that the laws of Edward the Confeſſor ſhould be reſtored. "What theſe laws of Edward the Confeſſor were (ſays Mr Hume), which the Engliſh, every reign, during a century and a half, deſired ſo paſſionately to have reſtored, is much diſputed by antiquarians; and our ignorance of them ſeems one of the greateſt defects of the ancient Engliſh hiſtory." The train of thinking into which Dr Stuart † has been led, points to an explanation of this myſtery. By the laws or cuſtoms of the Confeſſor, that condition of felicity was expreſſed, which had been enjoyed during the fortunate ſtate of the feudal aſſociation. The cordiality, equality, and independence, which then prevailed among all ranks in ſociety, continued to be remembered in leſs proſperous times, and occaſioned an ardent deſire for the revival of thoſe laws and uſages which had been the ſources of ſo much happineſs (G).

17 Solution of them.

18 Diſtinction concerning fiefs in the Anglo-Saxon and the Anglo-Norman times.

But, while the times of duke William and his ſucceſſors were diſcriminated from thoſe of the Confeſſor and the Anglo-Saxon princes, by the different ſtates they diſplayed of the feudal aſſociation, there is another circumſtance in the progreſs of fiefs, by which they were to be diſtinguiſhed more obviouſly.

Knight-ſervice, which, in France, and in the other kingdoms of Europe, was introduced in the gentle gradation of manners, was about to be diſcovered in England, after the ſame manner, when the battle of Haſtings facilitated the advancement of William the Norman to the crown of the Confeſſor. The ſituation of the Anglo-Saxons in an iſland, and the Daniſh invaſions, had obſtructed their refinement. In the memorable year 1066, when they loſt king Edward, and acquired duke William, they knew the perpetuity of the fief; but they were altogether ſtrangers to knight-ſervice and a knight's fee. The duchy of Normandy, when granted to Rollo by Charles the Simple, in the year 912, had yet experienced all the viciſſitudes of fiefs. And William, being the ſixth prince in the duchy, was familiar with the moſt extended ideas of the feudal ſyſtem. Theſe he brought with him into England, and they were to govern and direct his conduct.

19 Introduction of knight-ſervice into England.

The followers of Harold having forfeited their eſtates, they reverted to the crown. An immenſe number of lordſhips and manors being thus in the diſpoſal of William, he naturally gave them out after the forms of Normandy. Each grant, whether to a baron or a gentleman, was computed at ſo many fees; and each fee gave the ſervice of a knight. To the old beneficiary tenants, he was to renew their grants under this tenure. By degrees, all the military lands of the kingdom were to ſubmit to it. And with a view, doubtleſs, to this extenſion, the book of DOMESDAY was undertaken, which was to contain an exact ſtate of all the landed property in the kingdom. Inſtead, therefore, of bringing fiefs into England, this prince was only to introduce the laſt ſtep of their progreſs, the invention of the knight's fee, or the tenure of knight-ſervice.

In fact, it is to be ſeen by his laws, that he introduced *knight-ſervice*, and not *fiefs*. Nor let it be fancied, that this improvement was made by his ſingle authority and the power of the ſword. His laws not only expreſs its enactment in his reign, but mention that it was ſanctioned with the conſent of the common-council of the nation. It was an act of parliament, and not the will of a deſpot, that gave it validity and eſtabliſhment (H).

The meaſure, it is to be conceived, was even highly acceptable to all orders of men. For, a few only of the benefices of the Anglo-Saxon princes being in perpetuity, the greateſt proportion of the beneficiary or feudal tenants muſt have enjoyed their lands during life, or to a ſeries of heirs. Now, the advancement of ſuch grants into hereditary fiefs, under knight-ſervice, was

† *Ibid.* p. 102, &c.

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commendare, indeed, is ſaid by Spelman not to mean a feudal homage; (*Feuds and Tenures*, p. 35.) But the original Saxon evinces this ſenſe; and in fact the word *commendare*, notwithſtanding the authority of this learned gloſſographer, is uſed with the utmoſt propriety to expreſs a feudal homage. *Commendare ſe alicui*, was even the marked expreſſion for *faire l' hommage a un ſuſerain*. See *Du Cange*, voc. *Commendare et Bruſſel*, *Uſage general des fiefs*, p. 35, 276.

(G) There are laws which bear the name of Edward; but it is acknowledged on every hand, that their authority is not to be fully truſted. And in the queſtion treated, they are not of any uſe; unleſs it be, perhaps, that they illuſtrate the exiſtence of fiefs among the Anglo-Saxons. This compilation, however, though poſterior to the age of the Confeſſor, deſerves to be examined with more attention than has hitherto been beſtowed upon it. M. Honard, a foreign lawyer, whoſe acquaintance with the Norman cuſtoms is more intimate than with thoſe of the Anglo-Saxons, is the lateſt writer who ſeems to have made a ſtudy of it.

(H) The following very curious law of William the Norman makes expreſs mention of the *knight's fee* and *knight-ſervice*. It does more. It alludes to a prior law which actually eſtabliſhed this tenure, and which was the act of William and his parliament. It is, of conſequence, a deciſive proof of the introduction of the *knight's fee*, or of *knight-ſervice*, by this prince, and of this only. "Statuimus etiam et firmiter præcipimus, ut omnes comites, et "barones, et milites, et ſervientes, et univerſi liberi homines totius regni noſtri prædicti, habeant et teneant ſe ſemper bene in *armis*, et in *equis*, ut decet et oportet, et quod ſint ſemper prompti et bene parati ad *ſervitium ſuum integrum* nobis explendum, et peragendum, cum ſemper opus adfuerit, ſecundum quod NOBIS debent de *feodis et tenementis ſuis* de jure facere, et ſicut illis ſtatuimus per *commune conſilium* totius regni noſtri prædicti, et "dedimus et conceſſimus in feodo jure hæreditario." *LL. Guill.* c. 58.

was an important advantage and acquiſition. While it operated to the convenience and the grandeur of the ſovereign, it bettered the property, and ſecured the independence, of the ſubject.

20 Idea of the feodal militia. Ibid. p. 107, &c.

When the feodal aſſociation was cordial, there exiſted no neceſſity for the knight's fee. The vaſſals of a chief gave with pleaſure their aſſiſtance. When the aſſociation was diſcordant, different intereſts actuating the ſuperior and the vaſſal, art and policy were to preſcribe the exact ſervice to be performed. Nothing was to be left to friendſhip and cordiality. A rule, certain and definite, pointed out the duties of the vaſſal. This rule was the tenure of knight-ſervice.

A duchy, barony, or earldom, were the eſtates poſſeſſed by the nobles; and, being divided into fees, each of theſe was to ſupply its knight. A tenant of the crown, who was not created into nobility, but enjoyed a grant of land, furniſhed alſo his knights in proportion to his fees. The nobles and the gentry of a feudal kingdom were thus its defenders and guardians. And they granted out territory to perſons inferior to them in the diviſions of fees, and under the burden of knights. In proportion, therefore, to the extent of its lands, there was, in every feudal ſtate, an army, or a body of militia, for its ſupport and protection.

But while a force, numerous and ſufficient, was in this manner created, a care was alſo beſtowed to hold it in readineſs to take the field. The knights, who were to appear in proportion to the fees of each eſtate, were bound to aſſemble at a call, in complete armour, and in a ſtate for action. The feudal militia, of conſequence, could be marched, with expedition, to defend the rights of its nation, to ſupport its honour, or to ſpread its renown.

The uſual arms of a knight were the ſhield and helmet, the coat of mail, the ſword, or the lance. It was, alſo, his duty to have a horſe. For, a growing luxury, and the paſſion for ſhow, encouraged by tournaments, had brought diſcredit to the infantry, which had diſtinguiſhed the barbarians in their originals ſeats, and facilitated their victories over the Romans. The horſemen were called the *battle*, and the ſucceſs of every engagement was ſuppoſed to depend upon them. No proprietor of a fee, no tenant by knight-ſervice, fought on foot. The infantry conſiſted of men, furniſhed by the villages and the towns in the demeſnes of the prince or the nobles. The bow and the ſling were the arms of theſe; and tho', at firſt, of little conſideration, they were to grow more formidable.

During the warmth of the feodal aſſociation, the military ſervice of the vaſſal was every moment in the command of the ſuperior. When their aſſociation was decayed, it was not to be depended on; and, when afforded, was without zeal, and without advantage. The invention of knight-ſervice, which was to recover, in ſome degree, the vigour of this connection, while it aſcertained the exact duty to be rendered, was to fix its duration. Each poſſeſſor of a fee was, at his own expence, to keep himſelf in the field during 40 days. To this obligation, the great vaſſals of the crown were bound, and inferior proprietors were to ſubmit to it. When a ſingle battle was commonly to decide the fate and the diſputes of nations, this portion of time was conſiderable and important. And, if any expediency demanded a longer duty, the prince might retain his troops, but under the condition of giving them pay for their extraordinary ſervice.

Such was the military ſyſtem, which, during a long period of time, was to uphold the power of the monarchies of Europe; a ſyſtem, of which it was the admirable conſequence, that thoſe who were the proprietors of the land of a kingdom, were to defend it. They were the moſt intereſted in its welfare and tranquillity; and, while they were naturally diſpoſed to act with union and firmneſs againſt a foreign enemy, they were induced not leſs ſtrongly to guard againſt domeſtic tyranny. Their intereſt and happineſs, their pleaſure and convenience, urged them equally to oppoſe invaſions from abroad, inteſtine commotions, and the ſtretches of prerogative. A ſtrength, ſo natural, and which could never be exhauſted; a ſtrength, in which the prince was to have leſs authority than the nobles, and in which the power of both was checked by the numerous claſs of inferior proprietors; a ſtrength, which had directly in view the preſervation of civil liberty, ſeems, on a ſlight obſervation, the perfection of military diſcipline.

21 Its inefficacy and corruption.

But, notwithſtanding this advantage, the feudal militia was found incompatible with refining manners. It had been uſual, from the earlieſt times, for the ſuperior to levy a fine from the military tenant, who refuſed to take the field at his ſummons. As luxury encreaſed, men became leſs willing to join the army. Hence the commutation of ſervice for money, and the introduction of the tenure of *eſcuage*, which, inſtead of exacting the perſonal attendance of the knight, only obliged him to pay an annual ſum to his ſuperior *. As the kind was lord paramount of the whole kingdom, the money thus collected ultimately centered in him; and princes, inſtead of recruiting their armies, filled their exchequers. In order to defend their dominions, they hired mercenaries, compoſed of the dregs of the people. Theſe were diſbanded at the end of every campaign; and the diſturbances which ſuch numbers of idle banditti occaſioned all over Europe, ſhewed the neceſſity of ſtanding armies.

22 Riſe of ſtanding armies, &c.

The uſe of mercenaries gave birth to taxations, which began to be levied in every kingdom of Europe at the will of the prince. This produced contentions between ſovereigns and their ſubjects. In moſt countries of Europe the kings acquired the right of taxation, which, united to the command of the military force, forms the completion of deſpotiſm. In England, the prerogative of taxation, which the prince had aſſumed, was wreſted from him by the great charter of liberties. He was to command his mercenaries; but he was to depend, for their ſupport and their pay, on the generoſity of his people.

FEOFFMENT, in law, is a gift or grant of any manors, meſſuages, lands, or tenements, to another in fee; that is, to him and his heirs for ever, by delivery of ſeiſin, and poſſeſſion of the eſtate granted. See FEE.

FERÆ, in zoology, an order of quadrupeds. See ZOOLOGY.

FERALIA, in antiquity, a feſtival obſerved among the Romans on February 21ſt, or, according to Ovid, on the 17th of that month, in honour of the manes of their deceaſed friends and relations. During the ceremony, which conſiſted in making preſents at their graves, marriages were forbidden, and the temples of the divinities ſhut up; becauſe they fancied, that, during this feſtival, the ghoſts ſuffered no pains in hell, but were permitted to wander about their graves, and feaſt upon the meats prepared for them.

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* See the particular conſequences of this, under the article KNIGHT-*Service*.

FER DE FOURCHETTE, in heraldry, a croſs having at each end a forked iron, like that formerly uſed by ſoldiers to reſt their muſkets on. It differs from the croſs-fourché, the ends of which turn forked, whereas this has that ſort of fork fixed upon the ſquare end *.

* See *Heraldry*.

FER *de Mulin, Milrinde, Inke de Moulin*, in heraldry, is a bearing ſuppoſed to repreſent the iron-ink, or ink of a mill, which ſuſtains the moving mill-ſtone.

FERDINAND V. king of Spain, called *the Catholic*, which title was continued to his ſucceſſors. He married Iſabella of Caſtile, by which that kingdom was united to the Spaniſh crown. This illuſtrious couple, laid the foundation of the future glory and power of Spain. The conqueſt of Granada, and the diſcoveries of Chriſtopher Columbus, make this reign a celebrated æra in the hiſtory of Spain. He died in 1516, aged 63. See (*Hiſtory* of) SPAIN.

FERENTARII, in Roman antiquity, were auxiliary troops, lightly armed; their weapons being a ſword, bow, arrows, and a ſling.

FERENTINUM, (anc. geog.), a town of the Hernici in Latium, which the Romans, after ſubduing that nation, allowed to be governed by its own laws. Now *Feretino*, an epiſcopal city in the Campania of Rome. E. Long. 14. 5. N. Lat. 41. 45.

FERENTUM, or FORENTUM, (anc. geog.), a town of Apulia in Italy. Now *Forenza*, in the Baſilicata of Naples.

FERETRUM, among the Romans, the bier uſed in carrying out the bodies of the dead, which duty was performed by the neareſt male relations of the deceaſed: thus, ſons carried out their parents, brothers their ſiſters, &c.

FERGUS, the name of three kings of Scotland. See (*Hiſtory* of) SCOTLAND.

FERGUSON, (James), an eminent experimental philoſopher and mechanic, was born in Scotland, of very poor parents. At the earlieſt age his extraordinary genius began to exert itſelf. He firſt learned to read, by overhearing his father teach his elder brother: and he had made this acquiſition before any one ſuſpected it. He ſoon diſcovered a peculiar taſte for mechanics, which firſt aroſe on ſeeing his father uſe a lever. He purſued this ſtudy a conſiderable length, even whilſt very young; and made a watch in wood-work, from having once ſeen one. As he had no inſtructor, nor any help from books, every thing he learned had all the merit of an original diſcovery; and ſuch, with infinite joy, he believed it to be. As ſoon as his age would permit, he went to ſervice; in which he met with hardſhips, which rendered his conſtitution feeble thro' life. Whilſt he was ſervant to a farmer, (whoſe goodneſs he acknowledges in the modeſt and humble account of himſelf which he prefixed to his laſt publication), he frequently contemplated the ſtars; and began the ſtudy of aſtronomy, by laying down, from his own obſervations only, a celeſtial globe. His kind maſter, obſerving theſe marks of his ingenuity, procured him the countenance and aſſiſtance of his ſuperiors. By their help and inſtructions, he went on gaining farther knowledge, and was ſent to Edinburgh. There he began to take portraits; an employment by which he ſupported himſelf and family for ſeveral years, both in Scotland and England, whilſt he was purſuing more ſerious ſtudies. In London he firſt publiſhed ſome curious aſtronomical tables and calculations; and afterwards gave public lectures in experimental philoſophy, which he repeated (by ſubſcription) in moſt of the principal towns in England, with the higheſt marks of general approbation. He was elected a Fellow of the Royal Society, without paying for admiſſion (an honour ſcarcely ever conferred on a native); and had a penſion of 50 l. *per ann.* given him, unſolicited, by our gracious king, at his acceſſion, who had heard lectures from him, and frequently ſent for and converſed with him on curious topics. He alſo received ſeveral preſents from his majeſty, the patron of real merit. To what a degree of conſideration Mr Ferguſon mounted by the ſtrength of his natural genius, almoſt every one knows. He was univerſally conſidered as at the head of aſtronomy and mechanics in this nation of philoſophers. And he might juſtly be ſtyled ſelf-taught, or rather heaven-taught; for in his whole life he had not above half a-year's inſtruction at ſchool. He was a man of the cleareſt judgment, and the moſt unwearied application to ſtudy; benevolent, meek, and innocent in his manners as a child: humble, courteous, and communicative; inſtead of pedantry, philoſophy ſeemed to produce in him only diffidence and urbanity, —a love for mankind and for his Maker. His whole life was an example of reſignation and Chriſtian piety. He might be ſaid to be an enthuſiaſt in his love of God, if religion, founded on ſuch ſubſtantial and enlightened grounds as his was, could be ſtyled enthuſiaſm. He died in 1776.

FERIÆ, in Roman antiquity, holidays, or days upon which they abſtained from work.

The Romans had two kinds of feriæ: 1. the public, common to all the people in general; 2. The private, which were only kept by ſome private families.

The public feriæ were fourfold: 1. *Stativæ feriæ*, holidays which always fell out upon the ſame day of the month, and were marked in the calendar; of theſe the chief were the agonalia, carmentalia, and lupercalia. 2. *Comparitivæ feriæ*, holidays appointed every year upon certain or uncertain days by the magiſtrates or the pontiff; ſuch were the latinæ, paganalia, compitalia, &c. 3. *Imperativæ feriæ*, holidays commanded or appointed by the authority of the conſuls or prætors; of this kind we may reckon the lectiſternium. 4. *Nundinæ*, the days for fairs. See NUNDINÆ, *&c.*

FERIÆ *Latinæ*, were inſtituted by Tarquinius Superbus; who, having overcome the Tuſcans, made a league with the Latins, and propoſed to them to build a temple in common to Jupiter Latialis, in which both nations might meet, and offer ſacrifice for their common ſafety. At this feſtival a white bull was ſacrificed; and each town, both of the Latins and Romans, provided a certain quantity of meat, wine, and fruits. At firſt the ſolemnity continued but one day; after the expulſion of the kings, the ſenate added a third, a fourth, and ſo on to ten days.

FERIA, in the Romiſh breviary, is applied to the ſeveral days of the week; thus Monday is the *feria ſecunda*,

cunda, Tueſday the *feria tertia*; though theſe days are not working days, but holidays. The occaſion of this was, that the firſt Chriſtians were uſed to keep the eaſter-week holy, calling Sunday the *prima feria*, &c. whence the term *feria* was given to the days of every week. But beſides theſe, they have extraordinary feriæ, viz. the three laſt days of paſſion-week, the two following eaſter-day, and the ſecond feriæ of rogation.

FERMANAGH, a county of Ireland, in the province of Ulſter; bounded by Cavan on the ſouth, Tir-Oen on the north and north-eaſt, by Tyrconnel on the north-weſt, Leitrim on the ſouth-weſt, and Monaghan on the eaſt. It is 38 miles long and 24 broad. A great part of it is taken up with bogs, and the great lake called *Lough-Earne*, which is near 20 miles in length, and in ſome places 14 in breadth, diverſified with upwards of 300 iſlands, moſt of them well wooded, inhabited, and covered with cattle. It abounds alſo with great variety of fiſh, ſuch as huge-pike, large bream, roach, eels, trout, and ſalmon. The water of the lake in ſome places is ſaid to have a particular ſoftneſs and ſlimineſs, that bleaches linen much ſooner than could be done by other water. The lake is divided into the Upper and Lower, between which it contracts itſelf for five or ſix miles to the breadth of an ordinary river. In one part of the county are marble rocks 50 or 60 feet high. This county ſends four members to parliament, viz. two for the ſhire, and two for Inniſkillen the capital. Fermanagh gives the title of viſcount to earl Verney.

FERMENT, (*ſubſt.*) any body which, being applied to another, produces fermentation.

Ferments are either matters already in the act of fermentation, or that ſoon run into this act. Of the firſt kind are the flowers of wine, yeaſt, fermenting beer, or fermenting wine, &c. and of the ſecond are the new expreſſed vegetable juices of ſummer-fruit.

Among diſtillers, ferments are all thoſe bodies which, when added to the liquor, only correct ſome fault therein, and, by removing ſome obſtacle to fermentation, forward it by ſecondary means: as alſo ſuch as, being added in time of fermentation, make the liquor yield a larger proportion of ſpirit, and give it a finer flavour.

FERMENTATION, may be defined a ſenſible internal motion of the conſtituent particles of a moiſt, fluid, mixed, or compound body: by the continuance of which motion, theſe particles are gradually removed from their former ſituation or combination, and again, after ſome viſible ſeparation is made, joined together in a different order and arrangement, ſo that a new compound is formed, having qualities very ſenſibly different from thoſe of the original fluid.

Fermentation, properly ſo called, is confined to the vegetable and animal kingdoms; for the efferveſcences between acids and alkalies, however much they may reſemble the fermentation of vinous liquors, are nevertheleſs exceedingly different. It is divided into three kinds; or rather, there are three different ſtages of it, viz. the vinous, the acetous, and the putrefactive. Of the firſt, vegetables alone are ſuſceptible; the fleſh of young animals is in ſome ſlight degree ſuſceptible of the ſecond; but animal-ſubſtances are particularly ſuſceptible of the third, which vegetables do not ſo eaſily fall into without previouſly undergoing the firſt and ſecond. The produce of the firſt ſtage is wine, or ſome other vinous liquor; of the ſecond, vinegar; and of the third, volatile alkali. See BREWING, VINEGAR, &c.

Fermentation is one of the moſt obſcure proceſſes in nature, and no attempt has been made to ſolve it with any degree of probability. All that we know with regard to it is, that the liquor, however clear and tranſparent at firſt, no ſooner begins to ferment, than it becomes turbid, depoſits a ſediment, emits a great quantity of fixed air, and throws up a ſcum to the top, acquiring at the ſame time ſome degree of heat. The heat of the vinous ſtage, however, is but moderate, ſeldom or never exceeding that of the human body. The heat of the acetous is conſiderably greater; and that of the putrefactive is the greateſt of all, inſomuch that putrefying ſubſtances, when heaped together in great quantities, will ſometimes break forth into actual flame.

From theſe phenomena, fermentation would ſeem to be a proceſs ultimately tending to the entire diſſolution of the fermenting ſubſtance, and depending upon the action of the internal heat, etherial fluid, or whatever elſe we pleaſe to call it, which pervades, and makes an eſſential ingredient in, the compoſition of all bodies. From ſuch experiments as have been made upon this ſubject, it appears, that whether fixed air is the bond of connection between the particles of terreſtrial bodies or not, yet the emiſſion of it from any ſubſtance is always attended with a diſſolution of that ſubſtance. We cannot, however, in the preſent caſe, ſay that the emiſſion of the fixed air is the *cauſe* of the fermentation. It is in fact otherwiſe. Fixed air hath no tendency to fly off from terreſtrial ſubſtances with which it is united; on the contrary, it will very readily leave the atmoſphere, after it hath been united with it, to join itſelf to ſuch terreſtrial ſubſtances as are capable of abſorbing it. The emiſſion of it, therefore, muſt depend upon the action of ſome other fluid; moſt probably the fire or heat, which is diſperſed thro' all ſubſtances in a latent ſtate, and in the preſent caſe begins ſenſibly to manifeſt itſelf. But from what cauſe the heat originally begins to operate in this manner, ſeems to be entirely unknown and inexplicable, except that it appears ſome how or other to depend on the air; for, if that is totally excluded, fermentation will not go on.

FERN, FILIX, in botany. See FILICES.

Fern is very common in dry and barren places. It is one of the worſt weeds for lands, and very hard to deſtroy where it has any thing of a deep ſoil to root in. In ſome grounds, the roots of it are found to the depth of eight feet. One of the moſt effectual ways to deſtroy it is, often mowing the graſs; and, if the field is ploughed up, plentiful dunging thereof is very good: but the moſt certain remedy for it is urine. However, fern, cut while the ſap is in it, and left to rot upon the ground, is a very great improver of land.

In ſome places of the north, the inhabitants mow it green; and, burning it to aſhes, make thoſe aſhes up into balls with a little water. They then dry them in the ſun, and make uſe of them to clean their linen with; looking upon it to be near as good as ſoap for that purpoſe. It is ſaid, that the frequent treading them down by ſheep, while that ſort of cattle feed upon them, is an infallible method of killing them.

The ancients uſed the root of the fern and the whole plant, in decoctions and diet-drinks, in chronic diſorders of all kinds ariſing from obſtructions of the viſcera, particularly in hypochondriac caſes, and in obſtructions of the ſpleen and pancreas. There are not wanting modern authors who give it as high a character in theſe caſes as the ancients have done; but it is an ill-taſted medicine, and in no great uſe in the ſhops. The country-people eſteem it as a ſovereign remedy for that troubleſome diſtemper the rickets in children; and they give it alſo as a powder, after drying it in an oven, to deſtroy worms. As aperients and anthelmintics, the roots have been in high eſtimation with ſome; and Simon Pauli tells us, that they have been the grand ſecret of ſome empirics againſt the broad worm, called *tænia*. In the Medical Commentaries, vol. vi. p. 307. are given ſome inſtances of the ſucceſs of this remedy, by Dr Duncan of Edinburgh.

Female FERN. See PTERIS.

FERNANDO, or FERNANDES, an iſland in the Pacific Ocean. See JUAN *Fernandes*.

FERNELIUS (John), phyſician to Henry II. king of France, was born in Picardy, in the latter end of the 15th or the beginning of the 16th century. Being ſent to Paris to ſtudy rhetoric and philoſophy, he applied himſelf in a moſt intenſe manner. All other pleaſure was inſipid to him. He cared neither for play nor for walking, nor for entertainments, nor even for converſation. He read Cicero, Plato, and Ariſtotle. The reading of Cicero procured him this advantage, that the lectures he read on philoſophical ſubjects were as eloquent, as thoſe of the other maſters were barbarous at that time. He alſo applied himſelf very earneſtly to the mathematics.

This continual ſtudy drew upon him a long fit of ſickneſs, which obliged him to leave Paris. On his recovery, he returned thither with a deſign to ſtudy phyſic; but before he applied himſelf entirely to it, he taught philoſophy in the college of St Barbara. After this he ſpent four years in the ſtudy of phyſic; and, taking a doctor's degree, confined himſelf to his cloſet, in order to read the beſt authors, and to improve himſelf in the mathematics; that is, as far as the buſineſs of his profeſſion would ſuffer him. Never was a man more diligent than Fernel. He uſed to riſe at four o'clock in the morning, and ſtudied till it was time either to read lectures or to viſit patients. He then examined the urine that was brought him; for this was the method of thoſe times, with regard to the poor people, who did not ſend for the phyſician. Coming home to dine, he ſhut himſelf up among his books, till they called him down to table. Riſing from table, he returned to his ſtudy, which he did not leave without neceſſary occaſions. Coming home at night, he did juſt as at noon: he ſtaid among his books, till they called him to ſupper; returned to them the moment he had ſupped; and did not leave them till eleven o'clock, when he went to bed.

In the courſe of theſe ſtudies, he contrived mathematical inſtruments, and was at great charges in making them. But his wife murmuring at the expence, he diſmiſſed his inſtrument-makers, and applied himſelf in good earneſt to practiſe phyſic. But as viſiting patients did not employ his whole time, he read public lectures upon Hippocrates and Galen. This ſoon gained him a great reputation through France, and in foreign countries. His buſineſs increaſing, he left off reading lectures; but as nothing could make him ceaſe to ſtudy in private, he ſpent all the hours he could ſpare in compoſing a work of phyſic, intitled *Phyſiologia*, which was ſoon after publiſhed. He was prevailed with to read lectures upon this new work, which he did for three years: and undertaking another work, which he publiſhed, *De venæ ſectione*, he laid himſelf under a neceſſity of reading lectures ſome years longer, in order to explain this new book to the youth.

While he was thus employed, he was ſent for to court, in order to try whether he could cure a lady, whoſe recovery was deſpaired of. He was ſo happy as to cure her; which was the firſt cauſe of that eſteem which Henry II. who was then but dauphin, and was in love with that lady, conceived for him. This prince offered him, even then, the place of firſt phyſician to him; but Fernel, who infinitely preferred his ſtudies to the hurry of a court, would not accept the employment. When Henry came to the throne, he renewed his intreaties: but Fernel repreſented, that the honour which was offered to him was due, for ſeveral reaſons, and as an hereditary right, to the late king's phyſician; and that, as for himſelf, he wanted ſome time to make experiments concerning ſeveral diſcoveries he had made relating to phyſic. The king admitted this: but as ſoon as Francis I.'s phyſician died, Fernel was obliged to go and fill his place at Henry II.'s court. And here juſt the contrary to what he dreaded came to paſs: for he enjoyed more reſt and more leiſure at court, than he had done at Paris; and he might have conſidered the court as an agreeable retirement, had it not been for the journeys which the new civil war obliged the king to take. He died in 1558, leaving behind him a great many works, beſides what have been mentioned; as, *De abditis rerum cauſis*, ſeven books of Pathology, a book on Remedies, &c. They have been printed ſeveral times; with his life prefixed, written by William Plantius his diſciple.

FERONIA, the pagan goddeſs of woods and orchards. The deity took her name from the town Feronia, ſituated at the foot of mount Soracte in Italy, where was a wood and temple conſecrated to her. This town and wood are mentioned by Virgil, in the catalogue of Turnus's forces. Strabo relates, that thoſe, who ſacrificed to this goddeſs, walked barefoot upon burning coals, without being hurt. She was the guardian deity of freed-men, who received their cap of liberty in her temple.

FERRARS (George), a lawyer, poet, hiſtorian, and accompliſhed gentleman, was deſcended from an ancient family in Hertfordſhire, and born about the year 1510, in a village near St Alban's. He was educated at Oxford, and thence removed to Lincoln's inn; where applying with uncommon diligence to the ſtudy of the law, he was ſoon diſtinguiſhed for his elocution at the bar. Cromwell earl of Eſſex, the great miniſter of Henry VIII. introduced him to the king, who employed him as his menial ſervant, and, in 1535, gave him a grant of the manor of Flamſtead in his native county. This is ſuppoſed to have been a profitable eſtate; nevertheleſs, Mr Ferrars being a gay courtier, and probably an expenſive man, about ſeven years after, was taken to execution by a ſheriff's officer for a debt of 200 marks, and lodged in the compter. Being at this time member for Plymouth, the houſe of commons immediately interfered, and he ſoon obtained his liberty. He continued in favour with the king to the end of his reign, and in that of Edward VI. he attended the lord protector Somerſet as a commiſſioner of the army in his expedition to Scotland in 1548. In the ſame reign, the young king being then at Greenwich, Mr Ferrars was proclaimed *lord of miſrule*, that is, prince of ſports and paſtimes; which office he diſcharged during 12 days, in Chriſtmas holidays, to the entire ſatisfaction of the court. This is all we know of Mr Ferrars; except that he died in 1579, at Flamſtead in Hertfordſhire, and was buried in the pariſh-church. He is not leſs celebrated for his valour in the field, than for his other accompliſhments, as a gentleman and a ſcholar. He wrote, 1. Hiſtory of the Reign of queen Mary; publiſhed in Grafton's chronicle, 1569, fol. 2. Six Tragedies, or dramatic poems; publiſhed in a book called the *Mirror for magiſtrates*, firſt printed in 1559, afterwards in 1587, and again in 1610.

Ferrars (Henry), a Warwickſhire gentleman of a good family, was eminent in antiquities, genealogies, and heraldry. Mr Wood ſays, that out of the collections of this gentleman, Sir William Dugdale laid part of the foundation of his celebrated *Antiquities of Warwickſhire*. Camden alſo makes honourable mention of his aſſiſtance in relation to Coventry. Some ſcattered poems of his were publiſhed among others in the reign of queen Elizabeth; and he died in 1633.

FERRARA, a city of Italy, in the territory of the pope, capital of a duchy of the ſame name. It is ſeated in an agreeable and fertile plain; watered by the river Po, which is a defence on one ſide; and on the other is encompaſſed by a ſtrong wall, and deep broad ditches full of water, as well as by a good citadel, finiſhed by pope Paul. In the middle of the city is a magnificent caſtle, which was formerly the palace of the dukes, and is not now the leaſt ornament of Ferrara. It is quite ſurrounded with water; and the arſenal, which is near it, deſerves the obſervation of travellers. Over-againſt the palace is the duke's garden; with a park, called *Belvidere* on account of its beauty. Behind the garden there is a palace, built with white marble, called the *palace of diamonds*, becauſe all the ſtones are cut diamond faſhion.

Ferrara had formerly a conſiderable trade; but it is now almoſt deſerted, being very poor, inſomuch that there is hardly a perſon to be ſeen in the ſtreets. This is owing to the exactions of the popes. The fortifications are now neglected, and the ancient univerſity is dwindled into a wretched college of the Jeſuits. However, in 1735, it was advanced to an archbiſhopric by pope Clement XII. The country about it is ſo marſhy, that a ſhower or two of rain renders the roads almoſt impaſſable. It is 24 miles north-eaſt of Bologna, 38 north-weſt of Ravenna, 70 north-by-weſt of Florence, and 190 north of Rome. E. Long. 12. 14. N. Lat. 44. 36.

Ferrara, the duchy of a province in the pope's territory, bounded on the north by the ſtate of Venice; on the weſt, by the duchies of Mantua and Mirandola; on the ſouth, by the Bouloneſe, and by Romania, of which it was formerly a part; and on the eaſt, by the Gulph of Venice. It is 50 miles in length, and 43 in breadth along the coaſt; but grows narrower and narrower towards the Mantuan. This country is almoſt ſurrounded by the branches of the Po, which often overflow the country, and form the great moraſs of Comachio, which has a bad effect on the air. It is thin of people, and indifferently cultivated, though fit for corn, pulſe, and hemp. The Po and the lake of Comachio yield a large quantity of fiſh. Ferrara is the capital town; beſides which, there are Arano, Comachio, Magnavacca, Belriguardo, Cento, Buendeno, and Ficherola. This duchy was formerly poſſeſſed by the houſe of Eſte. But the pope took poſſeſſion of it in 1598, after the death of Alphonſo II. duke of Ferrara, it being a fief of the church.

FERRET, in zoology. See **Mustela**.

Ferrets, among glaſs-makers, the iron with which the workmen try the melted metal, to ſee if it be fit to work.—It is alſo uſed for thoſe irons which make the rings at the mouth of the bottles.

FERRETTO, in glaſs-making, a ſubſtance which ſerves to colour glaſs.

This is made by a ſimple calcination of copper, but it ſerves for ſeveral colours: there are two ways of making it. The firſt is this. Take thin plates of copper, and lay them on a layer of powdered brimſtone, in the bottom of a crucible; over theſe lay more brimſtone, and over that another layer of the plates, and ſo on alternately till the pot is full. Cover the pot, lute it well, place it in a wind-furnace, and make a ſtrong fire about it for two hours. When it is taken out and cooled, the copper will be found ſo calcined, that it may be crumbled to pieces between the fingers, like a friable earth. It will be of a reddiſh, and, in ſome parts, of a blackiſh colour. This muſt be powdered and ſifted fine for uſe.

FERRI (Cibo), a ſkilful painter born of a good family at Rome, in 1634. He was bred under Peter Cortona; and the works of the ſcholar are often miſtaken for thoſe of the maſter. The great duke of Tuſcany nominated him chief of the Florentine ſchool; and he was as good an architect as a painter. He died in 1689.

FERRO, (W. Long. 19°, N. Lat. 28°,) the moſt weſterly of the Canary iſlands, near the African coaſt, where the firſt meridian was lately fixed in moſt maps; but now, the geographers of almoſt every kingdom make their reſpective capitals the firſt meridian, as we do London. It is a dry and barren ſpot, affording no water except what is ſupplied in a very ſurpriſing manner by a tree which grows in theſe iſlands. See **Fountain**-*Tree*.

Ferro, or *Faro, Iſlands*; a cluſter of little iſlands lying in the Northern ocean, between 61° and 63° N. Lat. and between 5° and 8° W. Long. They belong to Denmark, and have about 3000 or 4000 inhabitants.

FERROL, a ſea-port town of Spain, in the province of Gallicia, ſeated on a bay of the Atlantic ocean. It has a good harbour, and is frequented by the Spaniſh fleet in time of war. W. Long. 8. 46. N. Lat. 43. 26.

FERRUGINOUS, any thing partaking of iron, or which contains particles of that metal.

FERRUGO, RUST. See RUST.

FERRUM, IRON. See IRON.

FERRY, a liberty by preſcription, or by the king's grant, to have a boat for paſſage, on a frith or river, for carrying paſſengers, horſes, &c. over the ſame for a reaſonable toll.

FERTILITY, that quality which denominates a thing fruitful or prolific.

Nothing can produce fertility in either ſex, but what promotes perfect health: nothing but good blood, ſpirits, and perfect animal functions, that is, high health, can beget perfect fecundity; and therefore, all means and medicines, all noſtrums and ſpecifics, to procure fertility, different from thoſe which procure good blood and ſpirits, are arrant quackery. Dr Cheyne ſays, that water-drinking males are very rarely infertile; and that if any thing in nature can prevent infertility, and bring fine children, it is a milk and ſeed diet perſevered in by both parents.

To increaſe the fertility of *vegetables*, ſays lord Bacon, we muſt not only increaſe the vigour of the earth and of the plant, but alſo preſerve what would otherwiſe be loſt: whence he infers, that there is much ſaved by ſetting, in compariſon of ſowing. It is reported, continues he, that if nitre be mixed with water to the thickneſs of honey, and after a vine is cut, the bud be anointed therewith, it will ſprout within eight days. If the experiment be true, the cauſe may be in the opening of the bud, and contiguous parts, by the ſpirit of the nitre; for nitre is the life of vegetables.

How far this may be true, is not perhaps ſufficiently ſhewn, notwithſtanding the experiments of Sir Kenelm Digby and M. Homberg. Conſult Mr Evelyn's Sylva, the Philoſophical Tranſactions, the French Memoirs, and Dr Stahl's Philoſophical Principles of Chemiſtry; but a proper ſet of accurate experiments ſeems ſtill wanting in this view.

FERULA, FENNEL-GIANT; a genus of the digynia order, belonging to the pentandria claſs of plants. There are nine ſpecies; all of them herbaceous perennials, riſing from three to ten or twelve feet high, with yellow flowers. They are propagated by ſeeds, which ſhould be ſown in autumn; and, when planted out, ought to be four or five feet diſtant from each other, or from any other plants; for no other will thrive under their ſhade.

FESSE, in heraldry, one of the nine honourable ordinaries. See HERALDRY.

FESSE-*Point*, is the exact centre of the eſcutcheon. See POINT.

FESSE-*Ways*, or *in* FESSE, denotes any thing borne after the manner of a feſſe; that is, in a rank acroſs the middle of the ſhield.

Party per FESSE, implies a parting acroſs the middle of the ſhield, from ſide to ſide, through the feſſe point.

FESTI DIES, in Roman antiquity, certain days in the year, devoted to the honour of the gods.

Numa, when he diſtributed the year into 12 months, divided the ſame into the *dies feſti*, *dies profeſti*, and *dies interciſi*.

The feſti were again divided into days of ſacrifices, banquets, games, and feriæ. See SACRIFICE, EPULÆ, LUDI, and FERIÆ.

The *profeſti* were thoſe days allowed to men for the adminiſtration of their affairs, whether of a public or private nature: theſe were divided into faſti, comitiales, &c. See FASTI, COMITIALES, &c.

The *interciſi* were days common both to gods and men, ſome parts of which were allotted to the ſervice of the one, and ſome to that of the other.

FESTINO, in logic, the third mood of the ſecond figure of the ſyllogiſm, the firſt propoſition whereof is an univerſal negative, the ſecond a particular affirmative, and the third a particular negative; as in the following example:

FES No bad man can be happy,
TI Some rich men are bad men.
NO *Ergo*, ſome rich men are not happy.

FESTIVAL, the ſame with feaſt. See FEAST.

FESTOON, in architecture and ſculpture, &c. an ornament in form of a garland of flowers, fruits, and leaves, intermixed or twiſted together.

It is in the form of a ſtring or collar, ſomewhat biggeſt in the middle, where it falls down in an arch; being extended by the two ends, the extremities of which hang down perpendicularly.

Feſtoons are now chiefly uſed in friezes, and other vacant places which want to be filled up and adorned; being done in imitation of the long cluſters of flowers, which the ancients placed on the doors of their temples and houſes on feſtival occaſions.

FESTUCA, FESCUE; a genus of graſſes of the digynia order, belonging to the triandria claſs of plants. —There are 16 ſpecies; two of which, as being the moſt remarkably uſeful, are deſcribed under the article AGRICULTURE, n° 51—56. Another ſpecies, called the *fluitans*, or *floting*, from its growing in wet ditches and ponds, is remarkable for the uſes that are made of its ſeeds. Theſe ſeeds are ſmall, but very ſweet and nouriſhing. They are collected in ſeveral parts of Germany and Poland, under the name of *manna ſeeds*; and are uſed at the tables of the great, in ſoups and gruels, on account of their nutritious quality and grateful flavour. When ground to meal, they make bread very little inferior to that in common uſe. The bran, ſeparated in preparing the meal, is given to horſes that have worms; but they muſt be kept from water for ſome hours afterwards. Geeſe are alſo very fond of theſe ſeeds.—Mr Lightfoot recommends this as a proper graſs to be ſown in wet meadows.

FESTUS (Pompeius), a celebrated grammarian of antiquity, who abridged a work of Verrius Flaccus, *De Significatione Verborum*; but took ſuch liberties in caſtration and criticiſing, as, Gerard Voſſius obſerves, are not favourable to the reputation of his author. A complete edition of his fragments was publiſhed by M. Dacier in 1681, for the uſe of the Dauphin. Scaliger ſays, that Feſtus is an author of great uſe to thoſe who would attain the Latin tongue with accuracy.

FETLOCK, in the manege, a tuft of hair growing behind the paſtern joint of many horſes; for thoſe of a low ſize have ſcarce any ſuch tuft.

FETTI (Domenico), an eminent painter in the ſtyle of Julio Romano, was born at Rome in 1589, and educated under Ludovico Civoli of Florence. He painted but little for churches, but excelled in hiſtory; his pictures are much ſought after, and are ſcarce. He abandoned himſelf to diſorderly courſes; and put an end to his life, by exceſſes, in the 35th year of his age.

FEUD (*Feida*), ſignifies, in the German tongue, *guerram*, Lat. *bellum;* and, according to Lambard, *capitales inimicitias;* and *feud* uſed in Scotland is a combination of kindred to revenge the death of any of their blood againſt the kiler, and all his race, or any other great enemy.

Feud *(Feoda)*, *Feod*, *Fief*, or *Fee*. See Feodal *Syſtem*.

Feuds are called by various names, according to their reſpective natures; as, Feudum *Antiquum*, a feud deſcending to a ſon, &c. from his anceſtors. Feudum *Apertum*, a feud reſulting back again to the lord of the fee; where the blood of the perſon laſt ſeized in fee-ſimple is utterly extinct and gone. Feudum *Honorarium*, (and *Feudum individuum)*, an honorary feud, or title of nobility, of an indiviſible nature, and deſcendible to the eldeſt ſon in excluſion of all the reſt. Feudum *Improprium*, an improper or derivative feud; and *feoda impropria*, are all ſuch feuds as do not fall within the deſcription of *feoda propria*. Feudum *Maternum*, a feud deſcending to the ſon from the mother. Feudum *Novum*, a feud newly acquired by the ſon; to which, in ancient times, only the deſcendents from his body could ſucceed, by the known maxims of the early feodal conſtitutions. Feudum *Novum*, held *ut antiquum;* deſcendible in the ſame manner as a *feudum novum*. Feudum *Paternum*, a feud deſcendible from father to ſon. Feudum *Proprium*, a *proper* feud diſtinguiſhed from an *improper*, which are the two grand diviſions.

FEUDAL, or Feodal. See Feodal.

FEUDATORY, or Feodatory, a tenant who formerly held his eſtate by feodal ſervice*.

Feu-duty, in Scots law, is the annual rent or duty which a vaſſal, by the tenor of his right, becomes bound to pay to his ſuperior.

Feu-*Holding*, in Scots law, is that particular tenure by which a vaſſal is taken bound to pay an annual rent or feu-duty to his ſuperior.

FEVER. See (Index ſubjoined to) Medicine.

The ancients deified the diſeaſes as well as the paſſions and affections of men. Virgil places them in the entrance into hell, *Æn*. vi. 273. Among theſe, *Fever* had a temple on mount Palatine, and two other parts of ancient Rome; and there is ſtill extant an inſcription to this goddeſs. FEBRI. DIVÆ. FEBRI. SANCTÆ. FEBRI. MAGNÆ. CAMILLA. AMATA. PRO. FILIO. MALE. AFFECTO.

Fever, in farriery. See there, § iv.

FEVERFEW, in botany. See Matricaria.

FEVERSHAM, a town of the county of Kent in England, ſituated on a branch of the river Thames, which is navigable for hoys. It is a member of the cinque-port of Dover. Oyſters, and many other articles, are ſent from hence to the London market. E. Long. 0. 38. N. Lat. 51. 20.

Fevre (Tanegui le), of Caen, in Normandy, born 1615, an excellent ſcholar in the Greek and Roman learning. Cardinal de Richelieu gave him a penſion of 2000 livres to inſpect all the works publiſhed at the Louvre, and deſigned to have made him principal of a college he was about to erect at Richelieu. But the cardinal's death cut off his hopes; and cardinal Mazarine having no great reliſh for learning, his penſion was ill-paid. Some time after, the Marquis de Franciere, governor of Langres, took him along with him to his government, and there he embraced the Proteſtant religion; after which he was invited to Saumur, where he was choſen Greek profeſſor. He there taught with extraordinary reputation. Young men were ſent to him from all the provinces in the kingdom, and even from foreign countries, while divines and profeſſors themſelves gloried in attending his lectures. He was preparing to go to Heidelberg, whither he was invited by the prince Palatine, when he died, aged 57. He wrote, 1. Notes on Anacreon, Lucretius, Longinus, Phædrus, Juſtin, Terence, Virgil, Horace, &c. 2. A ſhort account of the lives of the Greek poets. 3. Two volumes of letters; and many other works.

Fevre (Claud le), an eminent French painter, was born at Fountainbleau in 1633, and ſtudied in the palace there, and then at Paris under Le Sueur and Le Brun; the latter of whom adviſed him to adhere to portraits, for which he had a particular talent, and in his ſtyle equalled the beſt maſters of that country. He died in England in 1675, aged 42.

FEZ, the capital of a kingdom of the ſame name in Barbary, in Africa. It is a very large place, ſurrounded with high walls, within which there are hills and valleys, only the middle being level and flat. The river, which runs through the city, is divided into two ſtreams, from which canals are cut into every part of the town; ſo that the moſques, colleges, palaces, and the houſes of great men, are amply ſupplied with water. They have generally ſquare marble baſons in the middle of the court of their houſes, which are ſupplied with water by marble pipes that paſs through the walls: they conſtantly run over, and the ſtream returns back into the ſtreet, and ſo into the river. The houſes are built with brick or ſtone; and are adorned on the outſide with fine Moſaic work, or tiles like thoſe of Holland. The wood-work and cielings are carved, painted, and gilt. The roofs are flat; for they ſleep on the tops of the houſes in ſummer. Moſt of the houſes are two ſtories high, and ſome three. There are piazzas and galleries running all round the court on the inſide, ſo that you may go under cover from one apartment to another. The pillars are of brick, covered with glazed tiles, or of marble, with arches between. The timber-work is carved and painted with gay colours, and moſt of the rooms have marble ciſterns of water. Some of the great men build towers over their houſes ſeveral ſtories high, and ſpare no expence to render them beautiful; from hence they have a fine proſpect all over the city.

There are in this city 700 moſques, great and ſmall; 50 of which are magnificent, and ſupported with marble pillars, and other ornaments. The floors are covered with mats, as well as the walls to the height of a man. Every moſque has a tower or minaret, like thoſe in Turky, with a gallery on the top, from whence they call the people to prayers. The principal moſque is near a mile and a half in circumference. The middle building is 150 yards in length, and 80 in breadth, with a tower proportionably high. Round this to the eaſt, weſt, and north, there are great colonades 30 or 40 yards long. There are 900 lamps lighted every night; and in the middle of the moſque are large branches, which are capable of holding 500 lamps each. Along the walls are ſeven pulpits, from which the doctors of the law teach the people. The buſineſs of the prieſt is only to read prayers, and diſtribute alms to the people; to ſupport which, there are large revenues.

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* See Feodal Tenure.

Beſides the moſques, there are two colleges built in the Mooriſh manner, and adorned with marble and paintings. In one of them there are 100 rooms, beſides a magnificent hall. In this there is a great marble vaſe full of water, adorned with marble pillars of various colours, and finely poliſhed. The capitals are gilt, and the roof ſhines with gold, azure, and purple. The walls are adorned with Arabic verſes in gold characters. The other colleges are not near ſo beautiful, or rather all are gone to ruin ſince the neglect of learning.

There are hoſpitals in the city, where formerly all ſtrangers were maintained three days *gratis*. But the eſtates belonging to them are confiſcated for the emperor's uſe. There are above 100 public baths, many of which are ſtately buildings. People of the ſame trade or buſineſs live in ſtreets by themſelves.

Though the country about Fez is pleaſant and fertile, and in many places abounding with corn and cattle, yet a great part of it lies waſte and uncultivated, not ſo much for want of inhabitants, as from the oppreſſion of the governors; which makes the people chooſe to live at ſome diſtance from the high roads, where they cultivate juſt as much land as is neceſſary for their own ſubſiſtence.

Round the city there are fine marble tombs, monuments, and gardens full of all manner of fruit-trees.

Fez is ſeated on the river Cebu, W. Long. 4. 25. N. Lat. 33. 58.

FEWEL. See Fuel.

FIASCONE, a town of Italy in the territories of the pope, remarkable for its good wine. E. Long. 13. 12. N. Lat. 42. 20.

FIAT, in law, a ſhort order or warrant ſigned by a judge, for making out and allowing certain proceſſes.

FIBRARIÆ, a claſs of foſſils, naturally and eſſentially ſimple, not inflammable nor ſoluble in water; and compoſed of parallel fibres, ſome ſhorter, others longer; their external appearance being bright, and in ſome degree tranſparent: add to this, that they never give fire with ſteel, nor ferment with or are ſoluble in acid menſtrua.

FIBRE, in anatomy, a perfectly ſimple body, or at leaſt as ſimple as any thing in the human ſtructure; being fine and ſlender like a thread, and ſerving to form other parts. Hence ſome fibres are hard, as the bony ones; and others ſoft, as thoſe deſtined for the formation of all the other parts.

The fibres are divided alſo, according to their ſituation, into ſuch as are ſtraight, oblique, tranſverſe, annular, and ſpiral; being found arranged in all theſe directions in different parts of the body.

Fibre is alſo uſed to denote the ſlender Filaments which compoſe other bodies, whether animal, vegetable, or mineral; but more eſpecially, the capillary roots of plants.

FIBROSE, ſomething conſiſting of fibres, as the roots of plants. See Root.

FICINUS (Marcilius), of Florence, born 1433, applied himſelf particularly to the ſtudy of the Greek and Latin tongues; followed the Platonic ſect; and tranſlated into Latin the works of Plato, and of ſeveral great men who maintained that philoſophy, as Jamblichus, Plotinus, Proclus, &c. He died in 1449.

FICOIDES, a name given to ſeveral diſtinct plants, as the meſembryanthemum, muſa, and opuntia. See Mesembryanthemum.

FICTION. See Fable, and Poetry.

FICUS, the fig-tree; a genus of the trioecia order, belonging to the polygamia claſs of plants. There are ten ſpecies, of which the following are the moſt remarkable.

1. The carica, or common fig, with an upright ſtem branching 15 or 20 feet high, and garniſhed with large palmated or hand-ſhaped leaves. Of this there are a number of varieties; as the common fig, a large, oblong, dark purpliſh blue fruit; which ripens in Aguſt either on ſtandards or walls, and the tree carries a great quantity of fruit.—The brown or cheſtnut fig; a large, globular, cheſtnut-coloured fruit, having a purpliſh delicious pulp, ripening in July and Auguſt.—The black iſchia fig; a middle-ſized, ſhortiſh, flat-crowned, blackiſh fruit, having a bright pulp; ripening in the middle of Auguſt.—The green iſchia fig; a large, oblong, globular-headed, greeniſh fruit, ſlightly ſtained by the pulp to a reddiſh-brown colour; ripens in the end of Auguſt.—The brown iſchia fig; a ſmall, pyramidal, browniſh-yellow fruit, having a purpliſh very rich pulp; ripening in Auguſt and September.—The Malta fig; a ſmall flat-topped brown fruit, ripening in the middle of Auguſt or beginning of September.—The round brown Naples fig; a globular, middle-ſized, light-brown fruit, and browniſh pulp; ripe in the end of Auguſt.—The long, brown, Naples fig; a long dark-brown fruit, having a reddiſh pulp; ripe in September.—The great blue fig; a large blue fruit, having a fine red pulp.—The black Genoa fig; a large, pear-ſhaped, black-coloured fruit, with a bright red pulp; ripe in Auguſt.

2. The ſycamorus, or ſycamore of ſcripture. According to Mr Haſſelquiſt, this is a huge tree, the ſtem being often 50 feet round. The fruit is pierced in a remarkable manner by an inſect. There is an opening made in the calyx, near the time the fruit ripens, which is occaſioned in two different ways. 1. When the ſquamæ, which cover the calyx, wither and are bent back; which, however, is more common to the carica than the ſycamore. 2. A little below the ſcales, on the ſide of the flower-cup, there appears a ſpot before the fruit is ripe: the fruit in this place is affected with a gangrene which extends on every ſide, and frequently occupies a finger's-breadth. It withers; the place affected becomes black; the fleſhy ſubſtance in the middle of the calyx, for the breadth of a quill, is corroded; and the male bloſſoms, which are neareſt to the bare ſide, appear naked, opening a way for the inſect, which makes ſeveral furrows in the inſide of the fruit, but never touches the ſtigmata, though it frequently eats the germen. The wounded or gangrenous part is at firſt covered or ſhut up by the bloſſoms; but the hole is by degrees opened and enlarged of various ſizes in the different fruits; the margin and ſides being always gangrenous, black, hard, and turned inwardly. The ſame gangrenous appearance is alſo found near the ſquamæ, after the inſect has made a hole in that place. The tree is very common in the plains and fields of Lower Egypt. It buds in the latter end of March, and the fruit ripens in the beginning of

June. It is wounded or cut by the inhabitants at the time it buds; for without this precaution, they ſay, it would not bear fruit.

3. The religioſa, or banian-tree, is a native of ſeveral parts of the Eaſt Indies. It hath a woody ſtem, branching 20 or 30 feet high, with heart-ſhaped entire leaves, ending in acute points.—It is called by the Dutch, *devil's-tree;* and by the inhabitants of Ceylon, *budughaha*, and *budughas*. *Buddu*, according to the tradition of theſe countries, was the name of the prophet who firſt taught the Indians under the grateful ſhade of this tree: for this reaſon, they not only give this ſpecies of fig a name commemorative of their prophet, but likewiſe pay it a particular veneration, by celebrating all their ſacrifices under its ſhade.

Culture. The carica is the ſpecies moſt frequently cultivated in this country, and the only one which does not require to be kept in a ſtove. It may be propagated either by ſuckers ariſing from the root, by layers, or by cuttings.—The ſuckers are to be taken off as low down as poſſible; trim off any ragged part at bottom, leaving the tops entire, eſpecially if for ſtandards; and plant them in nurſery-lines at two or three feet diſtance from each other, or they may at once be planted where they are to remain; obſerving, that if they are deſigned for walls or eſpaliers, they may be headed to ſix or eight inches in March, the more effectually to force out lateral ſhoots near the bottom; but, if intended for ſtandards, they muſt not be topped, but trained with a ſtem, not leſs than 15 or 18 inches for dwarf-ſtandards, a yard for half-ſtandards, and four, five, or ſix feet for full ſtandards. Then they muſt be ſuffered to branch out to form a head; obſerving, that, whether againſt walls, eſpaliers, or ſtandards, the branches or ſhoots muſt never be ſhortened unleſs to procure a neceſſary ſupply of wood: for the fruit is always produced on the upper parts of the young ſhoots; and if theſe are cut off, no fruit can be expected.—The beſt ſeaſon for propagating theſe trees by layers is in autumn; but it may be alſo done any time from October to March or April. Chooſe the young pliable lower ſhoots from the fruitful branches: lay them in the uſual way, covering the body of the layers three or four inches deep in the ground, keeping the top entire, and as upright as poſſible; and they will be rooted and fit to ſeparate from the parent in autumn; when they may be planted either in the nurſery, or where they are to remain, managing them as above directed. The time for propagating by cuttings is either in autumn at the fall of the leaf, or any time in March: chooſe well-ripened ſhoots of the preceding ſummer; ſhort, and of robuſt growth, from about 12 to 15 inches long; having an inch or two of the two-years wood at their baſe, the tops left entire; and plant them ſix or eight inches deep, in a bed or order of good earth, in rows two feet aſunder: and when planted in autumn, it will be eligible to protect their tops in time of hard froſt, the firſt winter, with any kind of long looſe litter.

Uſes. Figs are a conſiderable article in the materia medica, chiefly employed in emollient cataplaſms and pectoral decoctions. The beſt are thoſe which come from Turky. Many are alſo brought from the ſouth of France, where they prepare them in the following manner. The fruit is firſt dipped in ſcalding-hot ley made of the aſhes of the fig-tree, and then dried in the ſun. Hence theſe figs ſtick to the hands, and ſcour them like lixivial ſalts; and for the ſame reaſon they excite to ſtool, without griping. They are moderately nutrimental, grateful to the ſtomach, and eaſier to digeſt than any other of the ſweet fruits. They have been ſaid to produce lice, when eaten as a common food; but this ſeems to be entirely without foundation. The reaſon of this ſuppoſition ſeems to be, that in the countries where they grow naturally, they make the principal food of the poor people, who are generally troubled with theſe vermin. The wood of the ſycamore is not ſubject to rot; and has therefore been uſed for making of coffins, in which embalmed bodies were put. Mr Haſſelquiſt affirms, that he ſaw in Egypt, coffins made of this kind of wood, which had been preſerved ſound for 2000 years.

FIDDLE. See Violin.

FIDDES (Richard), a learned divine and polite writer, was born in 1671, and educated at Oxford. He was preſented to the living of Halſham, in Yorkſhire, where he was ſo admired for the ſweetneſs of his voice, and the gracefulneſs of his delivery, that the people for ſeveral miles round flocked to his ſermons. Coming to London in 1712, he was, by the favour of dean Swift, introduced to the earl of Oxford, who made him one of his chaplains, and the queen ſoon after appointed him chaplain to the garriſon at Hull: but loſing his patrons upon the change of the miniſtry, he loſt his chaplainſhip; and being obliged to apply himſelf to writing, compoſed, 1. A body of Divinity; 2. The life of Cardinal Wolſey; 3. A treatiſe of morality, &c. He died in 1725.

FIDEI-commissum, in Roman antiquity, an eſtate left in truſt with any perſon, for the uſe of another. See Trustee.

FIDES, or Faith, one of the virtues, deified by the Pagans. She had a temple near the Capitol, founded by Numa Pompilius; but no animals were offered, or blood ſpilt, in her ſacrifices. During the performance of her rites, her prieſts appeared in white veſtments, with their heads and hands covered with linen, to ſhew that fidelity ought to be ſecret.

FIDIUS, in Pagan worſhip, a god who preſided over alliances and promiſes. This deity, which the Romans borrowed from the Sabines, was alſo called *Sanctus*, *Semon*, and *Semi-pater*.

FIELDING (Henry), a well-known writer of the preſent age, ſon of lieutenant-general Fielding who ſerved under the duke of Marlborough, was born in 1707. He had four ſiſters; of whom Sarah is well known, as writer of "The adventures of David Simple." On the death of his mother, his father married again; and Sir John Fielding who ſucceeded him in the commiſſion of the peace for Middleſex, is his brother by this marriage. Henry was ſent to ſtudy at Leyden; but a failure in his remittances obliged him to return in two years, when his own propenſity to gaiety and profuſion drove him to write for the ſtage at 20 years of age. His firſt dramatic piece "Love in ſeveral maſques," which was well received, appeared in 1727: and all his plays and farces, to the amount of 18, were written before the year 1737; and many of them are ſtill acted with applauſe. While he was thus employed, he married a young lady with 1500 l. fortune, and inherited an eſtate of 200 l. a-year from his mother: all which, though on the plan of retiring into the country, he contrived to diſſipate in three years; and then applied himſelf to the ſtudy of the law for a maintenance. In loſing his fortune, he acquired the gout: which rendering it impoſſible for him to attend the bar, he with a ſhattered conſtitution had recourſe to many extempore applications of his pen for immediate ſupplies; until, ſoon after the late rebellion, he accepted the office of acting juſtice for Middleſex, an employment much more profitable than honourable in the public eſteem. Reduced at length by the fatigues of this office, and by a complication of diſorders, he by the advice of his phyſicians went to Liſbon, where he died in 1754. He wrote a great number of fugitive pamphlets and periodical eſſays; but is chiefly diſtinguiſhed by his "Adventures of Joſeph Andrews," and "Hiſtory of Tom Jones:" in the former he took his character of parſon Adams from the reverend Mr Young, one of his moſt learned and eſteemed friends; who was remarkable for his acquaintance with the Greek authors, and had as paſſionate a veneration for Æſchylus as parſon Adams had, the overflowings of his beneficence were as ſtrong, and his fits of reverie and abſence of mind occurred too upon the moſt intereſting occaſions. His works have been collected and publiſhed, with his life prefixed, by Mr Murphy.

FIELD, in agriculture, a piece of ground incloſed, whether for tillage or paſture.

FIELD, in heraldry, is the whole ſurface of the ſhield, or the continent, ſo called becauſe it containeth thoſe atchievements anciently acquired in the field of battle. It is the ground on which the colours, bearings, metals, furs, charges, &c. are repreſented. Among the modern heralds, field is leſs frequently uſed in blazoning than ſhield or eſcutcheon. See the article SHIELD, &c.

FIELD-*Book*, in ſurveying, that wherein the angles, ſtations, diſtances, &c, are ſet down.

FIELD-*Colours*, in war, are ſmall flags of about a foot and half ſquare, which are carried along with the quarter-maſter general, for marking out the ground for the ſquadrons and battalions.

FIELD-*Fare*, in ornithology. See TURDUS.

FIELD-*Officers*, in the art of war. See OFFICER.

FIELD-*Pieces*, ſmall cannons, from three to twelve pounders, carried along with an army in the field.

FIELD-*Staff*, a weapon carried by the gunners, about the length of a halbert, with a ſpear at the end; having on each ſide ears ſcrewed on, like the cock of a match-lock, where the gunners ſcrew in lighted matches, when they are upon command; and then the field-ſtaffs are ſaid to be armed.

FIELD-*Works*, in fortification, are thoſe thrown up by an army in beſieging a fortreſs, or by the beſieged to defend the place. Such are the fortifications of camps, highways, &c.

Elyſian FIELDS. See ELYSIAN.

FIENUS (Thomas), an ingenious and learned phyſician, born at Antwerp in 1566. He went into Italy to ſtudy phyſic under Mercurialis and Aldrovandus; and on his return diſtinguiſhed himſelf ſo much in the univerſity of Louvain, that he was there choſen profeſſor of phyſic, and was afterwards made phyſician to the duke of Bavaria. He wrote ſeveral works, among which were, "De viribus imaginationis;" and "De formatione fetus." He died at Louvain in 1631.

FIERI FACIAS, in law, a writ that lies where a perſon has recovered judgment for debt or damages in the king's courts againſt one, by which the ſheriff is commanded to levy the debt and damages on the defendant's goods and chattels.

FIFE, in muſic, is a ſort of wind-inſtrument, being a ſmall pipe. See PIPE.

FIFE, in geography, a county of Scotland bounded by the Frith of Tay on the north, by the German ſea on the eaſt, by the Frith of Forth on the ſouth, and by Monteith and Stirling on the weſt. It is above 40 miles in length, and 17 in breath. The face of the country is various. Towards the weſt it is mountainous; the middle is moſt proper for paſture; but the northern and ſouthern parts are plain and fertile, producing excellent corn, full of towns, and indented with good bays and harbours. The whole coaſt is almoſt covered with fiſhing-towns; breed a great number of hardy ſeamen; and, being all royal boroughs, ſend many members to parliament. The inland parts of the county are adorned with plantations and woods, affording ſhelter to deer and all ſorts of game. The hills are covered with ſheep, whoſe wool is excellent; and the paſtures feed plenty of black cattle. This county alſo produces quarries of excellent free-ſtone, coal-mines, and lead-ore in great quantity; together with variegated cryſtals. It is well watered by many lakes and rivers, the principal of which are the Leven and the Eden, both of which abound with ſalmon. On the preſent condition of the county of Fife Dr Campbell has the following obſervations *. "One would be apt to imagine, that from ſuch an excellent ſituation, this country muſt have been diſtinguiſhed by being wonderfully populous, crowded with towns, and theſe towns abounding with commerce. Anciently, it ſeems, it was ſo: and if it be not in this condition now, the reaſons may eaſily be aſſigned; it would be well if they could be eaſily removed. After the acceſſion of king James VI. to the throne of England, the court lords extended what they called the *power of the crown*; but which, reſting in their hands, was, in reality, theirs beyond meaſure; and this was oppoſed, for purpoſes merely their own, by others, who, in right of popularity, exerciſed alſo a power more detrimental to the public peace, and not at all more directed to the public good; and thus the true principles of policy were in a manner loſt. On the other hand, an unreaſonable and ill-timed zeal for forms produced as unreaſonable an averſion for things indifferent in themſelves; and thus, while religion was all the cry, the true ſpirit of the Chriſtian faith was in a manner extinguiſhed. Party-diſputes in church and ſtate, deſtroying, as they ever will do, all ſenſe of public ſpirit, made way for a civil war, which ruined the ſmall remains of paſt proſperity. After the reſtoration, an oppreſſive government in one part of the country, which connived, for its own ſupport, at the eſtabliſhment of a more oppreſſive ariſtocracy in the other, extirpated all ſeeds of induſtry, and brought on that general decay in Agriculture, manufactures, and commerce, which, however viſible, was, till very lately, rather to be lamented, even by the moſt diſintereſted patriots, than with any rational hopes of ſucceſs to be put in any train of being recovered.

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* *Political Survey*, I. 202.

However diſtaſteful, in one light, the contemplation of its former greatneſs may be, it cannot but afford us ſatisfaction in another; for what has once been, may moſt certainly be again. The country and the climate, without queſtion, are as good as ever; and though the ſame thing cannot be ſaid of its ports, yet, with ſome labour and a little expence, even theſe may be made ſo; after which, if any method can be found to employ in manufactures, and thereby engage the youth to remain at home, there is no doubt that an indefatigable application may quickly reſtore what a ſeries of unfortunate accidents, ſucceeded by ſupine neglect, have brought into ſo melancholy a condition."

Fife-*Rails*, in a ſhip, are thoſe that are placed on baniſters, on each ſide of the top of the poop, and ſo along with haunces or falls.—They reach down to the quarter-deck, and to the ſtair of the gang-way.

FIFTH, in muſic. See Interval.

FIG, or Fig-tree. See Ficus.

FIGWORT, a plant called by the botaniſts Scrophularia.

FIGURAL, Figurate, or *Figurative*, a term applied to whatever is expreſſed by obſcure reſemblances. The word is chiefly applied to the types and myſteries of the Moſaic law; as alſo to any expreſſion which is not taken in its primary and literal ſenſe.

FIGURE, in phyſics, expreſſes the ſurface or terminating extremities of any body.

Figures, in arithmetic, are certain characters whereby we denote any number which may be expreſſed by any combination of the nine digits, &c. See Arithmetic.

Figure, among divines, is uſed for the myſteries repreſented under certain types.

Figure, in dancing, denotes the ſeveral ſteps which the dancer makes in order and cadence, conſidered as they mark certain figures on the floor. See Dancing.

Figure, in painting and deſigning, denotes the lines and colours which form the repreſentation of any animal, but more particularly of a human perſonage, See Painting, n° 61—92.

Figure, in logic, denotes a certain order and diſpoſition of the middle term in any ſyllogiſm.

Figures are fourfold. 1. When the middle term is the ſubject of the major propoſition, and the predicate of the minor, we have what is called the firſt figure. 2. When the middle term is the predicate of both the premiſſes, the ſyllogiſm is ſaid to be in the ſecond figure. 3. If the middle term is the ſubject of the two premiſſes, the ſyllogiſm is in the third figure; and laſtly, by making it the predicate of the major, and ſubject of the minor, we obtain ſyllogiſms in the fourth figure. Each of theſe figures has a determinate number of moods, including all the poſſible ways in which propoſitions differing in quantity or quality can be combined, according to any diſpoſition of the middle term, in order to arrive at a juſt concluſion. See Logic.

Figure, in compoſition. See Oratory; alſo Allegory, Apostrophe, Hyperbole, Metaphor, Personification, &c.

A Figure, *the means or inſtrument conceived to be the agent.* When we ſurvey a number of connected objects, that which makes the greateſt figure employs chiefly our attention; and the emotion it raiſes, if lively, prompts us even to exceed nature in the conceptions we form of it. Take the following examples.

For Neleus' ſon Alcides' *rage* had ſlain.
A broken rock the *force* of Pirus threw.

In theſe inſtances, the rage of Hercules and the force of Pirus, being the capital circumſtances, are ſo far exalted as to be conceived the agents that produce the effects.

In the following inſtances, hunger being the chief circumſtance in the deſcription, is itſelf imagined to be the patient.

Whoſe hunger has not taſted food theſe three days.
Jane Shore.

——————As when the *force*
Of ſubterranean wind tranſports a hill. *Paradiſe loſt.*

——————As when the *potent rod*
Of Amram's ſon, in Egypt's evil day
Wav'd round the coaſt, upcall'd a pitchy cloud
Of locuſts. *Paradiſe loſt.*

A Figure, *which, among related objects, extends the properties of one to another.* This figure is not dignified with a proper name, becauſe it has been overlooked by writers. It merits, however, a place in this work; and muſt be diſtinguiſhed from the others elſewhere treated, as depending on a different principle. *Giddy brink, jovial wine, daring wound,* are examples of this figure. Here are adjectives that cannot be made to ſignify any quality of the ſubſtantives to which they are joined: a *brink*, for example, cannot be termed *giddy* in a ſenſe, either proper or figurative, that can ſignify any of its qualities or attributes. When we examine attentively the expreſſion, we diſcover, that a *brink* is termed *giddy* from producing that effect in thoſe who ſtand on it: in the ſame manner, a wound is ſaid to be *daring*, not with reſpect to itſelf, but with reſpect to the boldneſs of the perſon who inflicts it: and wine is ſaid to be *jovial*, as inſpiring mirth and jollity. Thus the attributes of one ſubject are extended to another with which it is connected; and the expreſſion of ſuch a thought muſt be conſidered as a figure, becauſe the attribute is not applicable to the ſubject in any proper ſenſe.

How are we to account for this figure, which we ſee lies in the thought, and to what principle ſhall we refer it? Have poets a privilege to alter the nature of things, and at pleaſure to beſtow attributes upon a ſubject to which they do not belong? It is obſerved †, that the mind paſſeth eaſily and ſweetly along a train of connected objects; and, where the objects are intimately connected, that it is diſpoſed to carry along the good or bad properties of one to another; eſpecially when it is in any degree inflamed with theſe properties. From this principle is derived the figure under conſideration. Language, invented for the communication of thought, would be imperfect, if it were not expreſſive even of the ſlighter propenſities and more delicate feelings: but language cannot remain ſo imperfect among a people who have received any poliſh; becauſe language is regulated by internal feeling, and is gradually improved to expreſs whatever paſſes in the mind. Thus, for example, when a ſword in the hand of a coward is termed *a coward ſword*, the expreſſion is ſignificative of an internal operation; for the mind, in paſſing from the agent

† Vid. *Elem. of Criticiſm*, chap. ii. part 1. § 6.

to its inſtrument, is diſpoſed to extend to the latter the properties of the former. Governed by the ſame principle, we ſay *liſtening* fear, by extending the attribute *liſtening* of the man who liſtens, to the paſſion with which he is moved. In the expreſſion, *bold deed*, or *audax facinus*, we extend to the effect what properly belongs to the cauſe. But not to waſte time by making a commentary upon every expreſſion of this kind, the beſt way to give a complete view of the ſubject, is to exhibit a table of the different relations that may give occaſion to this figure. And in viewing the table, it will be obſerved, that the figure can never have any grace but where the relations are of the moſt intimate kind.

1. An attribute of the cauſe expreſſed as an attribute of the effect.

Audax facinus.

Of yonder fleet a *bold* diſcovery make.

An impious mortal gave the *daring* wound.

———To my *advent'rous* ſong,
That with no middle flight intends to ſoar.
Paradiſe loſt.

2. An attribute of the effect expreſſed as an attribute of the cauſe.

Quos periiſſe ambos *miſero* cenſebam in mari. *Plautus.*

No wonder, fallen ſuch a *pernicious* height.
Paradiſe loſt.

3. An effect expreſſed as an attribute of the cauſe.

Jovial wine, Giddy brink, Drowſy night, Muſing midnight, Panting height, Aſtoniſh'd thought, Mournful gloom.

Caſting a dim *religious* light. MILTON, *Comus.*

And the *merry* bells ring round,
And the *jocund* rebecks ſound. MILTON, *Allegro.*

4. An attribute of a ſubject beſtowed upon one of its parts or members.

Longing arms.

It was the nightingale, and not the lark,
That pierc'd the *fearful* hollow of thine ear.
Romeo and Juliet, act 3. *ſc.* 7.

———Oh, lay by
Thoſe moſt ungentle looks and angry weapons;
Unleſs you mean my griefs and killing fears
Should ſtretch me out at your *relentleſs* feet
Fair Penitent, act 3.

———And ready now
To ſtoop with *wearied* wing, and *willing* feet,
On the bare outſide of this world. *Paradiſe loſt, b.* 3.

5. A quality of the agent given to the inſtrument with which it operates.

Why peep your *coward* ſwords half out their ſhells?

6. An attribute of the agent given to the ſubject upon which it operates.

High-climbing hill. *Milton.*

7. A quality of one ſubject given to another.

Icci, *beatis* nunc Arabum invides
Gazis. *Horat. Carm. l.* 1. *ode* 29.

When ſapleſs age, and weak unable limbs,
Should bring thy father to his *drooping* chair.
Shakeſpear.

By art, the pilot through the boiling deep,
And howling tempeſt, ſteers the *fearleſs* ſhip.
Iliad xxiii. 385.

Then, nothing loath, th' enamour'd fair he led,
And ſunk tranſported on the *conſcious* bed.
Odyſſey viii. 337.

A *ſtupid* moment motionleſs ſhe ſtood.
Summer, l. 1336.

8. A circumſtance connected with a ſubject, expreſſed as a quality of the ſubject.

Breezy ſummit.

'Tis ours the chance of *fighting* fields to try.
Iliad i. 301.

Oh! had I dy'd before that *well-fought* wall.
Odyſſey v. 395.

From this table it appears, that the adorning a cauſe with an attribute of the effect, is not ſo agreeable as the oppoſite expreſſion. The progreſs from cauſe to effect is natural and eaſy: the oppoſite progreſs reſembles retrograde motion*; and therefore *panting height, aſtoniſh'd thought*, are ſtrained and uncouth expreſſions, which a writer of taſte will avoid.

It is not leſs ſtrained, to apply to a ſubject in its preſent ſtate, an epithet that may belong to it in ſome future ſtate:

Submerſaſque obrue puppes. *Æneid* i. 73.

And mighty *ruins* fall. *Iliad* v. 411.

Impious ſons their *mangled* fathers wound.

Another rule regards this figure, That the property of one ſubject ought not to be beſtow'd upon another with which that property is incongruous:

K. Rich.———How dare thy joints forget
To pay their *awful* duty to our preſence?
Richard II. *act* 3. *ſc.* 6.

The connection between an awful ſuperior and his ſubmiſſive dependent is ſo intimate, that an attribute may readily be transferred from the one to the other: but awfulneſs cannot be ſo transferred, becauſe it is inconſiſtent with ſubmiſſion.

FIGURE *of Speech*, as peculiarly diſtinguiſhed from the above and from thoſe firſt referred to.] Under the article METAPHOR *and Allegory*, a figure of ſpeech is defined, "The uſing a word in a ſenſe different from what is proper to it;" and the new or uncommon ſenſe of the word is termed *the figurative ſenſe*. The figurative ſenſe muſt have a relation to that which is proper; and the more intimate the relation is, the figure is the more happy. How ornamental this figure is to language, will not be readily imagined by any one who hath not given peculiar attention; and therefore we ſhall endeavour to unfold its capital beauties and advantages. In the firſt place, a word uſed figuratively, or in a new ſenſe, ſuggeſts at the ſame time the ſenſe it commonly bears: and thus it has the effect to preſent two objects; one ſignified by the figurative ſenſe, which may be termed *the principal object*; and one ſignified by the proper ſenſe, which may be termed *acceſſory*: the principal makes a part of the thought; the acceſſory is merely ornamental. In this reſpect, a figure of ſpeech is preciſely ſimilar to concordant ſounds in muſic, which, without contributing to the melody, make it harmonious.

Elem. of Criticiſm.

To explain the matter by examples. *Youth*, by a figure of ſpeech, is termed *the morning of life*: This expreſſion ſignifies *youth*, the principal object which enters into the thought; it ſuggeſts, at the ſame time, the proper ſenſe of *morning*; and this acceſſory object, being in itſelf beautiful, and connected by reſemblance to the principal object, is not a little ornamental. *Imperious ocean* is an example of a different kind, where an attribute is expreſſed figuratively: Together with *ſtormy*, the figurative meaning of the epithet *imperious*, there is ſuggeſted its proper meaning, viz. the ſtern authority of a deſpotic prince; and theſe two are ſtrongly connected by reſemblance. Upon this figurative power of words, Vida deſcants with elegance, *Poet. lib.* iii. 44.

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* See PERCEPTION *and Ideas in a Train.*

In the next place, this figure poſſeſſes a ſignal power of aggrandiſing an object, by the following means. Words, which have no original beauty but what ariſes from their ſound, acquire an adventitious beauty from their meaning: a word ſignifying any thing that is agreeable, becomes by that means agreeable; for the agreeableneſs of the object is communicated to its name. This acquired beauty, by the force of cuſtom adheres to the word even when uſed figuratively; and the beauty received from the thing it properly ſignifies, is communicated to the thing which it is made to ſignify figuratively. Conſider the foregoing expreſſion *Imperious ocean*, how much more elevated it is than *Stormy ocean*.

Thirdly, This figure hath a happy effect by preventing the familiarity of proper names. The familiarity of a proper name, is communicated to the thing it ſignifies by means of their intimate connection; and the thing is thereby brought down in our feeling. This bad effect is prevented by uſing a figurative word inſtead of one that is proper; as, for example, when we expreſs the ſky by terming it *the blue vault of heaven*; for though no work of art can compare with the ſky in grandeur, the expreſſion however is reliſhed, becauſe it prevents the object from being brought down by the familiarity of its proper name. With reſpect to the degrading the familiarity of proper names, Vida has the following paſſage.

> Hinc ſi dura mihi paſſus dicendus Ulyſſes,
> Non illum vero memorabo nomine, ſed qui
> Et mores hominum multorum vidit, et urbes,
> Naufragus everſæ poſt ſæva incendia Trojæ.
>
> *Poet. lib.* ii. l. 46.

Laſtly, By this figure, language is enriched, and rendered more copious; in which reſpect, were there no other, a figure of ſpeech is a happy invention. This property is finely touched by Vida; *Poet. lib.* iii. 90.

The beauties we have mentioned belong to every figure of ſpeech. Several other beauties peculiar to one or other ſort, we ſhall have occaſion to remark afterward.

Not only ſubjects, but qualities, actions, effects, may be expreſſed figuratively. Thus, as to ſubjects, *the gates of breath* for the lips, *the watery kingdom* for the ocean. As to qualities, *fierce* for ſtormy, in the expreſſion *Fierce winter*; *altus* for profundus, *Altus puteus, Altum mare*; *breathing* for perſpiring, *Breathing plants*. Again, as to actions, The ſea *rages*, Time will *melt* her frozen thoughts, Time *kills* grief. An effect is put for the cauſe, as *lux* for the ſun; and a cauſe for the effect, as *boum labores* for corn. The relation of reſemblance is one plentiful ſource of figures of ſpeech; and nothing is more common than to apply to one object the name of another that reſembles it in any reſpect: Height, ſize, and worldly greatneſs, reſemble not each other; but the emotions they produce reſemble each other, and, prompted by this reſemblance, we naturallly expreſs worldly greatneſs by height or ſize: One feels a certain uneaſineſs in ſeeing a great depth; and, hence depth is made to expreſs any thing diſagreeable by exceſs, as *depth* of grief, *depth* of deſpair: Again, height of place, and time long paſt, produce ſimilar feelings; and hence the expreſſion, *Ut altius repetam:* Diſtance in paſt time, producing a ſtrong feeling, is put for any ſtrong feeling, *Nihil mihi antiquius noſtra amicitia:* Shortneſs with relation to ſpace, for ſhortneſs with relation to time, *Brevis eſſe laboro, obſcurus fio:* Suffering a puniſhment reſembles paying a debt; hence *pendere pœnas*. In the ſame manner, light may be put for glory, ſunſhine for proſperity, and weight for importance.

Many words, originally figurative, having, by long and conſtant uſe, loſt their figurative power, are degraded to the inferior rank of proper terms. Thus the words that expreſs the operations of the mind, have in all languages been originally figurative: the reaſon holds in all, that when theſe operations came firſt under conſideration, there was no other way of deſcribing them but by what they reſembled: it was not practicable to give them proper names, as may be done to objects that can be aſcertained by ſight and touch. A *ſoft* nature, *jarring* tempers, *weight* of wo, *pompous* phraſe, *beget* compaſſion, *aſſuage* grief, *break* a vow, *bend* the eye downward, *ſhower* down curſes, *drown'd* in tears, *wrapt* in joy, *warm'd* with eloquence, *loaded* with ſpoils, and a thouſand other expreſſions of the like nature, have loſt their figurative ſenſe. Some terms there are, that cannot be ſaid to be altogether figurative or altogether proper: originally figurative, they are tending to ſimplicity, without having loſt altogether their figurative power. Virgil's *Regina ſaucia cura*, is perhaps one of theſe expreſſions: with ordinary readers, *ſaucia* will be conſidered as expreſſing ſimply the effect of grief; but one of a lively imagination will exalt the phraſe into a figure.

For epitomiſing this ſubject, and at the ſame time for giving a clear view of it, lord Kaims * gives a liſt of the ſeveral relations upon which figures of ſpeech are commonly founded. This liſt he divides into two tables; one of ſubjects expreſſed figuratively, and one of attributes.

TAB. I. *Subjects expreſſed figuratively.*

1. A word proper to one ſubject employed figuratively to expreſs a reſembling ſubject.

There is no figure of ſpeech ſo frequent, as what is derived from the relation of reſemblance. Youth, for example, is ſignified figuratively by the *morning* of life. The life of a man reſembles a natural day in ſeveral particulars: the morning is the beginning of a day, youth the beginning of life; the morning is chearful, ſo is youth, &c. By another reſemblance, a bold warrior is termed the *thunderbolt* of war; a multitude of troubles, a *ſea* of troubles.

This figure, above all others, affords pleaſure to the mind by variety of beauties. Beſides the beauties above-mentioned, common to all ſorts, it poſſeſſes in particular the beauty of a metaphor or of a ſimile: a figure of ſpeech built upon reſemblance, ſuggeſts always a compariſon between the principal ſubject and the acceſſory; whereby every good effect of a metaphor or ſimile, may, in a ſhort and lively manner, be produced by this figure of ſpeech.

2. A word proper to the effect employed figuratively to expreſs the cauſe.

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* *Elem. of Criticiſm*, II. 305.

Lux for the ſun; *Shadow* for cloud. A helmet is ſignified by the expreſſion *glittering terror;* a tree by *ſhadow* or *umbrage*. Hence the expreſſion:

Nec habet Pelion umbras. *Ovid.*

Where the dun umbrage hangs. *Spring, l.* 1023.

A wound is made to ſignify an arrow:

Vulnere non pedibus te conſequar. *Ovid.*

There is a peculiar force and beauty in this figure: the word which ſignifies figuratively the principal ſubject, denotes it to be a cauſe by ſuggeſting the effect.

3. A word proper to the cauſe, employed figuratively to expreſs the effect.

Boumque labores for corn. *Sorrow* or *grief* for tears.

Again Ulyſſes veil'd his penſive head;
Again, unmann'd, a ſhow'r of *ſorrow* ſhed.

Streaming *Grief* his faded cheek bedew'd.

Blindneſs for darkneſs:

Cæcis erramus in undis. *Æneid.* iii 200.

There is a peculiar energy in this figure, ſimilar to that in the former: the figurative name denotes the ſubject to be an effect, by ſuggeſting its cauſe.

4. Two things being intimately connected, the proper name of the one employed figuratively to ſignify the other.

Day for light. *Night* for darkneſs; and hence, A ſudden night. *Winter* for a ſtorm at ſea:

Interea magno miſceri murmure pontum,
Emiſſamque Hyemem ſenſit Neptunus. *Æneid,* i. 128.

This laſt figure would be too bold for a Britiſh writer, as a ſtorm at ſea is not inſeparably connected with winter in this climate.

5. A word proper to an attribute, employed figuratively to denote the ſubject.

Youth and *beauty* for thoſe who are young and beautiful:

Youth and beauty ſhall be laid in duſt.

Majeſty for the king:

What art thou, that uſurp'ſt this time of night,
Together with that fair and warlike form
In which the *Majeſty* of buried Denmark
Did ſometime march? *Hamlet, act* 1. *ſc.* 1.

——— Or have ye choſen this place
After the toils of battle, to repoſe
Your weary'd *virtue.* *Paradiſe loſt.*

Verdure for a green field. *Summer, l.* 301.

Speaking of cranes,

The pigmy nations wounds and death they bring,
And all the *war* deſcends upon the wing. *Iliad* iii. 10.

Cool *age* advances venerably wiſe. *Iliad* iii. 149.

The peculiar beauty of this figure ariſes from ſuggeſting an attribute that embelliſhes the ſubject, or puts it in a ſtronger light.

6. A complex term employed figuratively to denote one of the component parts.

Funus for a dead body. *Burial* for a grave.

7. The name of one of the component parts inſtead of the complex term.

Tæda for a marriage. The *Eaſt* for a country ſituated eaſt from us. *Jovis veſtigia ſervat,* for imitating Jupiter in general.

8. A word ſignifying time or place, employed figuratively to denote what is connected with it.

Clime for a nation, or for a conſtitution of government: hence the expreſſion, *Merciful clime, Fleecy winter* for ſnow, *Seculum felix.*

9. A part for the whole.

The *pole* for the earth. The *head* for the perſon:

Triginta minas pro *capite* tuo dedi. *Plautus.*

Tergum for the man:

Fugiens tergum. *Ovid.*

Vultus for the man:

Jam fulgor armorum fugaces
Terret equos, equitumque vultus. *Horat.*

Quis deſiderio ſit pudor aut modus
Tam chari *capitis?* *Horat.*

Dumque virent *genua?* *Horat.*

Thy growing virtues juſtify'd my cares,
And promis'd comfort to my *ſilver hairs.* *Iliad* ix. 616.

——— Forthwith from the pool he rears
His mighty *ſtature.* *Paradiſe Loſt.*

The ſilent *heart* which grief aſſails. *Parnell.*

The peculiar beauty of this figure conſiſts in marking that part which makes the greateſt figure.

10. The name of the container, employed figuratively to ſignify what is contained.

Grove for the birds in it, Vocal *grove*. *Ships* for the ſeamen, Agonizing *ſhips*. *Mountains* for the ſheep paſturing upon them, Bleating *mountains*. *Zacynthus, Ithaca,* &c. for the inhabitants. *Ex mæſtis domibus,* Livy.

11. The name of the ſuſtainer, employed figuratively to ſignify what is ſuſtained.

Altar for the ſacrifice. *Field* for the battle fought upon it, Well-fought *field*.

12. The name of the materials, employed figuratively to ſignify the things made of them.

Ferrum for *gladius*.

13. The names of the Heathen deities, employed figuratively to ſignify what they patroniſe.

Jove for the air, *Mars* for war, *Venus* for beauty, *Cupid* for love, *Ceres* for corn, *Neptune* for the ſea, *Vulcan* for fire.

This figure beſtows great elevation upon the ſubject; and therefore ought to be confined to the higher ſtrains of poetry.

TAB. II. *Attributes expreſſed figuratively.*

When two attributes are connected, the name of the one may be employed figuratively to expreſs the other.

Purity and virginity are attributes of the ſame perſon: hence the expreſſion, *Virgin* ſnow, for pure ſnow.

2. A word ſignifying properly an attribute of one ſubject, employed figuratively to expreſs a reſembling attribute of another ſubject.

Tottering ſtate. *Imperious* ocean. *Angry* flood. *Raging* tempeſt. *Shallow* fears.

My ſure divinity ſhall bear the ſhield,
And edge thy ſword to *reap* the glorious field.
Odyſſey xx. 61.

Black omen, for an omen that portends bad fortune.

Ater odor. *Virgil.*

The peculiar beauty of this figure ariſes from ſuggeſting a compariſon.

3. A word proper to the ſubject, employed to expreſs one of its attributes.

Mens for *intellectus*. *Mens* for a reſolution:

Iſtam, oro, exue mentem.

4. When two ſubjects have a reſemblance by a common quality, the name of the one ſubject may be employed figuratively to denote that quality in the other: *Summer* life for agreeable life.

5. The name of the inſtrument made to ſignify the power of employing it:

> ——— Melpomene, cui liquidam pater
> Vocem cum *cithara* dedit.

The ample field of figurative expreſſion diſplayed in theſe tables, affords great ſcope for reaſoning. Several of the obſervations relating to metaphor*, are applicable to figures of ſpeech: theſe ſhall be ſlightly retouched, with ſome additions peculiarly adapted to the preſent ſubject.

1. As the figure under conſideration is built upon relation, we find from experience, and it muſt be obvious from reaſon, that the beauty of it depends on the intimacy of the relation between the figurative and proper ſenſe of the word. A ſlight reſemblance, in particular, will never make this figure agreeable: the expreſſion, for example, *Drink down a ſecret*, for liſtening to a ſecret with attention, is harſh and uncouth, becauſe there is ſcarce any reſemblance between *liſtening* and *drinking*. The expreſſion *weighty crack*, uſed by Ben Johnſon for *loud crack*, is worſe if poſſible: a loud ſound has not the ſlighteſt reſemblance to a piece of matter that is weighty.

> Phemius! let acts of gods, and heroes old,
> What ancient bards in hall and bow'r have told,
> Attemper'd to the lyre, your voice employ,
> Such the pleas'd *ear will drink* with ſilent joy.
> *Odyſſey* i. 433.

> Strepitumque exterritus *hauſit*. *Æneid* vi. 559.

> ——————— Write, my queen,
> And with mine eyes I'll *drink* the words you ſend.
> *Cymbeline, act* 1. *ſc.* 2.

> As thus th' effulgence tremulous I *drink*.
> *Summer, l.* 1684.

> Neque *audit* currus habenas. *Georg*. i. 514.

> O prince! (Lycaon's valiant ſon reply'd),
> As thine the ſteeds, be thine the taſk to guide.
> The horſes practis'd to their lord's command,
> Shall *hear* the rein, and anſwer to thy hand. *Iliad* v. 288.

The following figures of ſpeech ſeem altogether wild and extravagant, the figurative and proper meaning having no connection whatever. *Moving* ſoftneſs, Freſhneſs *breathes*, *Breathing* proſpect, *Flowing* ſpring, *Dewy* light, *Lucid* coolneſs, and many others of this falſe coin, may be found in Thomſon's *Seaſons*.

2. The proper ſenſe of the word ought to bear ſome proportion to the figurative ſenſe, and not ſoar much above it, nor ſink much below it. This rule, as well as the foregoing, is finely illuſtrated by Vida, *Poet*. iii. 148.

3. In a figure of ſpeech, every circumſtance ought to be avoided that agrees with the proper ſenſe only, not with the figurative ſenſe; for it is the latter that expreſſes the thought, and the former ſerves for no other purpoſe but to make harmony:

> Zacynthus green with ever-ſhady groves,
> And Ithaca, preſumptuous boaſt their loves;
> Obtruding on my choice a ſecond lord,
> They preſs the Hymenean rite abhorr'd.
> *Odyſſey*, xix. 152.

Zacynthus here ſtanding figuratively for the inhabitants, the deſcription of the iſland is quite out of place: it puzzles the reader, by making him doubt whether the word ought to be taken in its proper or figurative ſenſe.

> ——————— Write, my queen,
> And with mine eyes I'll drink the words you ſend,
> Though ink be made of gall. *Cymbeline, act* 1. *ſc.* 2.

The diſguſt one has to drink ink in reality, is not to the purpoſe where the ſubject is drinking ink figuratively.

4. To draw conſequences from a figure of ſpeech, as if the word were to be underſtood literally, is a groſs abſurdity; for it is confounding truth with fiction:

> Be Moubray's ſins ſo heavy in his boſom,
> That they may break his foaming courſer's back,
> And throw the rider headlong in the liſts,
> A caitiff recreant to my couſin Hereford.
> *Richard* II. *act* 1. *ſc.* 3.

Sin may be imagined heavy in a figurative ſenſe: but weight in a proper ſenſe belongs to the acceſſory only; and therefore to deſcribe the effects of weight, is to deſert the principal ſubject, and to convert the acceſſory into a principal:

> *Cromwell*. How does your Grace?
> *Wolſey*. Why, well;
> Never ſo truly happy, my good Cromwell.
> I know myſelf now, and I feel within me
> A peace above all earthly dignities,
> A ſtill and quiet conſcience. The King has cur'd me,
> I humbly thank his Grace; and, from theſe ſhoulders,
> Theſe ruin'd pillars, out of pity, taken
> A load would ſink a navy, too much honour.
> *Henry* VIII. *act* 3. *ſc.* 6.

Ulyſſes ſpeaking of Hector:

> I wonder now how yonder city ſtands,
> When we have here the baſe and pillar by us.
> *Troilus and Creſſida, act* 4. *ſc.* 9.

> *Othello*. No; my heart is turn'd to ſtone: I ſtrike it, and it hurts my hand. *Othello, act* 4. *ſc.* 5.

> Not leſs, even in this deſpicable now,
> Than when my name fill'd Afric with affrights,
> And froze your hearts beneath your torrid zone.
> *Don Sebaſtian King of Portugal, act* 1.

> How long a ſpace, ſince firſt I lov'd, it is!
> To look into a glaſs I fear,
> And am ſurpris'd with wonder, when I miſs,
> Grey hairs and wrinkles there.
> *Cowley, vol.* 1. *p.* 86.

> I choſe the flouriſhing'ſt tree in all the park,
> With freſheſt boughs, and faireſt head:
> I cut my love into his gentle bark,
> And in three days behold 'tis dead;
> My very written flames ſo violent be,
> They've burnt and wither'd up the tree.
> *Cowley, vol.* 1. *p.* 136.

> Ah, mighty Love, that it were inward heat
> Which made this precious limbeck ſweat!
> But what, alas! ah what does it avail
> That ſhe weeps tears ſo wond'rous cold,
> As ſcarce the aſs's hoof can hold,
> So cold, that I admire they fall not hail?
> *Cowley, vol.* 1. *p.* 132.

Such a play of words is pleaſant in a ludicrous poem.

> *Almeria*. O Alphonſo, Alphonſo!
> Devouring ſeas have waſh'd thee from my ſight,
> No time ſhall raſe thee from my memory;
> No, I will live to be thy monument:
> The cruel ocean is no more thy tomb;
> But in my heart thou art interr'd.
> *Mourning Bride, act*. 1. *ſc.* 1.

This would be very right, if there were any inconſiſtence, in being interred in one place really, and in another place figuratively.

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* See Metaphor.

From conſidering, that a word uſed in a figurative ſenſe ſuggeſts at the ſame time its proper meaning, we diſcover a fifth rule, That we ought not to employ a word in a figurative ſenſe, the proper ſenſe of which is inconſiſtent or incongruous with the ſubject: for every inconſiſtency, and even incongruity, though in the expreſſion only and not real, is unpleaſant:

> Interea genitor Tyberini ad fluminis undam
> Vulnera *ſiccabat* lymphis ———————
> *Æneid.* x. 833.
>
> Tres adeo incertos cæca caligine *ſoles*
> Erramus pelago, totidem ſine ſidere noctes.
> *Æneid.* iii. 203.

The foregoing rule may be extended to form a ſixth, That no epithet ought to be given to the figurative ſenſe of a word that agrees not alſo with its proper ſenſe:

> ——————— Dicat Opuntiæ
> Frater Megillæ, quo *beatus*
> Vulnere. *Horat. Carm. lib.* 1. *ode* 27.
>
> Parcus deorum cultor, et infrequens,
> *Inſanientis* dum ſapientiæ
> Conſultus erro. *Horat. Carm. l.* 1. *ode* 54.

Seventhly, The crowding into one period or thought different figures of ſpeech, is not leſs faulty than crowding metaphors in that manner: the mind is diſtracted in the quick tranſition from one image to another, and is puzzled inſtead of being pleaſed:

> I am of ladies moſt deject and wretched,
> That ſuck'd the honey of his muſic vows. *Hamlet.*
>
> My bleeding boſom ſickens at the ſound.
> *Odyſſey* i. 439.
>
> ————————— Ah miſer,
> Quanta laboras in *Charybdi!*
> Digne puer meliore *flamma.*
> Quæ ſaga, quis te ſolvere Theſſalis
> Magus *venenis*, quis poterit deus?
> Vix illigatum te triformi
> Pegaſus expediet *Chimera.*
> *Horat. Carm. lib.* 1. *ode* 27.

Eighthly, If crowding figures be bad, it is ſtill worſe to graft one figure upon another: For inſtance,

> While his keen falchion drinks the warriors lives.
> *Iliad* xi. 211.

A falchion drinking the warriors blood is a figure built upon reſemblance, which is paſſable. But then in the expreſſion, *lives* is again put for *blood;* and by thus grafting one figure upon another, the expreſſion is rendered obſcure and unpleaſant.

Ninthly, Intricate and involved figures, that can ſcarce be analyſed, or reduced to plain language, are leaſt of all tolerable:

> Votis incendimus aras. *Æneid.* iii. 279.
>
> ———— Onerentque caniſtris
> Dona laboratæ Cereris. *Æneid.* viii. 180.

Vulcan to the Cyclopes:

> Arma acri facienda viro: nunc viribus uſus,
> Nunc manibus rapidis, omni nunc arte magiſtra:
> *Præcipitate* moras. *Æneid.* viii. 441.
>
> ———— Huic gladio, perque ærea ſcuta
> Per tunicam ſqualentem auro, latus *haurit* apertum.
> *Æneid.* x. 313.
>
> Scriberis Vario fortis, et hoſtium
> Victor, Mæonii carminis *alite.*
> *Horat. Carm. lib.* 1. *ode* 6.

> Elſe ſhall our fates be number'd with the dead.
> *Iliad* v. 294.
>
> Commutual death the fate of war confounds.
> *Iliad* viii. 85. *and* xi. 117.

Speaking of Proteus.

> Inſtant he wears, eluſive of the rape,
> The mimic force of every ſavage ſhape.
> *Odyſſey* iv. 563.
>
> Rolling convulſive on the floor, is ſeen
> The piteous object of a proſtrate queen.
> *Ibid.* iv. 652.
>
> The mingling tempeſt weaves its gloom.
> *Autumn*, 337.
>
> A various ſweetneſs ſwells the gentle race. *Ibid.* 640
>
> A ſober calm fleeces unbounded ether. *Ibid.* 967.
>
> The diſtant water-fall ſwells in the breeze.
> *Winter*, 738.

In the tenth place, When a ſubject is introduced by its proper name, it is abſurd to attribute to it the properties of a different ſubject to which the word is ſometimes applied in a figurative ſenſe:

> Hear me, oh Neptune! thou whoſe arms are hurl'd
> From ſhore to ſhore, and gird the ſolid world
> *Odyſſey* ix. 617.

Neptune is here introduced perſonally, and not figuratively for the ocean: the deſcription therefore, which is only applicable to the latter, is altogether improper.

It is not ſufficient, that a figure of ſpeech be regularly conſtructed, and be free from blemiſh: it requires taſte to diſcern when it is proper, when improper; and taſte perhaps is our only guide. One, however, may gather from reflections and experience, that ornaments and graces ſuit not any of the diſpiriting paſſions, nor are proper for expreſſing any thing grave and important. In familiar converſation, they are in ſome meaſure ridiculous: Proſpero, in the *Tempeſt*, ſpeaking to his daughter Miranda, ſays,

> The fringed curtains of thine eyes advance,
> And ſay what thou ſeeſt yond.

No exception can be taken to the juſtneſs of the figure; and circumſtances may be imagined to make it proper: but it is certainly not proper in familiar converſation.

In the laſt place, Though figures of ſpeech have a charming effect when accurately conſtructed and properly introduced, they ought, however, to be ſcattered with a ſparing hand: nothing is more luſcious, and nothing conſequently more ſatiating, than redundant ornaments of any kind.

FIGURED, in general, ſomething marked with figures.

The term *figured* is chiefly applied to ſtuffs, whereon the figures of flowers, and the like, are either wrought or ſtamped.

Figured, in muſic, is applied either to ſimple notes or to harmony: to ſimple notes, as in theſe words *figured baſs*, to expreſs a baſs whoſe notes carrying chords are ſubdivided into many other notes of leſſer value; to harmony, when, by ſuppoſition and in a diatonick procedure, other notes than thoſe which form the chord are employed *.

To *figure* is to paſs ſeveral notes for one; to form runnings or variations; to add ſome notes to the air, in whatever manner it be done; in ſhort, it is to give to harmonious ſounds a figure of melody, by connecting

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* See Suppoſi

ing them with other intermediate ſounds.

FILAMENT, in anatomy, natural hiſtory, &c. a term uſed in the ſame ſenſe with fibre, for thoſe fine threads whereof the fleſh, nerves, ſkin, plants, roots, &c. are compoſed. See Fibre.

Vegetable Filaments form a ſubſtance of great uſe in the arts and manufactures; furniſhing thread, cloth, cordage, &c.

For theſe purpoſes the filamentous parts of the *Cannabis* and *Linum*, or hemp and flax, are employed among us*. But different vegetables have been employed in different countries for the ſame uſes. Putrefaction deſtroys the pulpy or fleſhy matter, and leaves the tough filaments entire: By curiouſly putrefying the leaf of a plant in water, we obtain the fine flexile fibres, which conſtituted the baſis of the ribs and minute veins, and which now form as it were a ſkeleton of the leaf. Alkaline lixivia, in ſome degree, produce ſimilar effects to putrefaction.

The Sieur de Flacourt, in his hiſtory of Madagaſcar, relates, that different kinds of cloth are prepared in that iſland, from the filaments of the bark of certain trees boiled in ſtrong ley; that ſome of theſe cloths are very fine, and approach to the ſoftneſs of ſilk, but in durability come ſhort of cotton; that others are coarſer and ſtronger, and laſt thrice as long as cotton; and that of theſe the ſails and cordage of his veſſel were made. See alſo the article Bark.

The ſame author informs us, that the ſtalks of nettles are uſed for the like purpoſes in his own country, France. And Sir Hans Sloane relates, in one of his letters to Mr Ray, that he has been informed by ſeveral, that muſlin and callico, and moſt of the Indian linens, are made of nettles.

In ſome of the Swediſh provinces, a ſtrong kind of cloth is ſaid to be prepared from hop-ſtalks: and in the tranſactions of the Swediſh academy for the year 1750, there is an account of an experiment made in conſequence of that report. Of the ſtalks, gathered in Autumn, about as many were taken, as equalled in bulk a quantity of flax that would have produced a pound after preparation. The ſtalks were put into water, and kept covered therewith during the winter. In March they were taken out, dried in a ſtove, and dreſſed as flax. The prepared filaments weighed nearly a pound, and proved fine, ſoft, and white: They were ſpun and woven into ſix ells of fine ſtrong cloth, The author, Mr Shiſler, obſerves, that hop-ſtalks take much longer time to rot than flax; and that, if not fully rotted, the woody part will not ſeparate, and the cloth will neither prove white nor fine.

Hemp, flax, and all other vegetable filaments, and thread or cloth prepared from them, differ remarkably from wool, hair, ſilk, and other animal productions, not only in the principles into which they are reſoluble by fire, but likewiſe in ſome of their more intereſting properties, particularly in their diſpoſition to imbibe colouring matters; ſundry liquors, which give a beautiful and durable dye to thoſe of the animal, giving no ſtain at all to thoſe of the vegetable kingdom.

A ſolution of copper in aqua-fortis, which had been changed blue by an addition of volatile ſpirit, on being mixed with a little ſolution of tin, became turbid and greeniſh. Pieces of white ſilk and flannel boiled, without any previous preparation, in this mixture, received a bright deep yellow dye, whilſt pieces of linen, prepared and unprepared, came out as colourleſs as they were put in.

Fiſhing-nets are uſually boiled with oak-bark or other like aſtringents, which render them more laſting. Thoſe made of flax receive from this decoction a browniſh colour, which, by the repeated alternations of water and air, is in a little time diſcharged, whilſt the fine gloſſy brown, communicated by the ſame means to ſilken nets, permanently reſiſts both the air and water, and ſtands as long as the animal filaments themſelves. In like manner the ſtain of ink, or the black dye from ſolutions of iron, mixed with vegetable aſtringents, proves durable in ſilk and woollen; but from linen, the aſtringent matter is extracted by waſhing, and only the yellow iron-mould remains.

The red decoction of cochineal, which, heightened with a little ſolution of tin, gives the fiery ſcarlet dye to wool or ſilk that have been previouſly impregnated with ſolution of tartar, makes no impreſſion upon linen or cotton prepared in the ſame manner. Mr du Fay informs us in the Memoirs of the French Academy for the year 1737, that having prepared a mixed cloth whoſe warp was of wool, and the woof of cotton, and thoroughly blended the two together by fulling, he ſtill found the cotton to reſiſt the action of the ſcarlet liquor, and the wool to receive the ſame colour from it as wool by itſelf, the ſtuff coming out all over marbled fiery and white.

Many other inſtances of this kind are known too well to the callico-printer; whoſe grand deſideratum it is, to find means of making linen receive the ſame colours that wool does. The phyſical cauſe of the difference is wholly unknown; and indeed, of the theory of dyes in general, we know as yet extremely little. (See Dyeing.) Are animal filaments tubular, and the colouring atoms received within them? Are vegetable filaments ſolid, and the colour depoſited on the ſurface? Or does not their different ſuſceptibility of colour depend rather on the different intrinſic properties of the two? There are many inſtances of a like diverſity, even in the metallic kingdom, where a mechanical difference in texture can ſcarcely be preſumed to be the cauſe: Thus ſilver receives a deep ſtain from ſulphureous or putrid vapours, or the yolk of a boiled egg, which have no effect upon tin.

Filaments, among botaniſts, particularly ſignify the ſtamina. See Botany, p. 1294.

FILANDERS, in falconry, a diſeaſe in hawks, &c. conſiſting of filaments or ſtrings of blood coagulated; and occaſioned by a violent rupture of ſome vein, by which the blood, extravaſating, hardens into theſe figures, and incommodes the reins, hips, &c.

Filanders, are alſo worms as ſmall as thread, and about an inch long, that lie wrapt up in a thin ſkin, or net, near the reins of an hawk, apart from either gut or gorge.

This malady is known by the hawk's poverty; by ruffling her tail; by her ſtraining the fiſt, or perch, with her pounces; and laſtly, by croaking in the night, when the filanders prick her. The diſeaſe proceeds from bad food; and muſt be remedied in time, to prevent its ſpreading over the whole body, and deſtroying the bird. Theſe muſt not be killed as other worms are, for fear of impoſthumes from their corruption, being

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* See *Hemp* and *Flax*; alſo *Cotton*.

ing incapable of paſſing away with the hawk's meat. They muſt only be ſtupified, to prevent their being offenſive; and this is done by giving the hawk a clove of garlic, after which ſhe will feel nothing of the filanders for 40 days. It will be prudent in the falconer, when he obſerves the hawk poor and low, to give her a clove of garlic once a-month by way of prevention.

FILBERT, or **Filberd**, the fruit of the corylus, or hazel. See Corylus.

FILE, among mechanics, a tool uſed in metal, &c. in order to ſmooth, poliſh, or cut.

This inſtrument is of iron or forged ſteel, cut in little furrows, with chiſſels and a mallet, this and that way, and of this or that depth, according to the grain or touch required. After cutting the file, it muſt be tempered with a compoſition of chimney-ſoot, very hard and dry, diluted and wrought up with urine, vinegar, and ſalt; the whole being reduced to the conſiſtence of muſtard. Tempering the files conſiſts in rubbing them over with this compoſition, and covering them in loam; after which they are put in a charcoal fire, and taken out by that time they have acquired a cherry colour, which is known by a ſmall rod of the ſame ſteel put in along with them. Being taken out of the fire, they are thrown into cold ſpring-water; and when cold, they are cleaned with charcoal and a rag; and being clean and dry, are kept from ruſt by laying them up in wheat bran. Iron files require more heating than ſteel ones. Files are of different forms, ſizes, cuts, and degrees of fineneſs, according to the different uſes and occaſions for which they are made. See Filing.

File, in the art of war, a row of ſoldiers, ſtanding one behind another, which is the depth of the batalion or ſquadron. The files of a batalion of foot are generally three dep; as are ſometimes thoſe of a ſquadron of horſe. The files muſt be ſtraight and parallel one to another.

File, in law, a thread, ſtring, or wire, upon which writs and other exhibits in courts and offices are faſtened or filed, for the more ſafe keeping, and ready turning to the ſame. A file is a record of the court; and the filing of a proceſs of a court makes it a record of it. An original writ may be filed after judgment given in the cauſe, iſſued forth before; declarations, &c. are to be filed, and affidavits muſt be filed, ſome before they are read in court, and ſome preſently when read in court. Before filing a record removed by *certiorari*, the juſtices of B. R. may refuſe to receive it, if it appears to be for delay, &c.; and remand it back for the expedition of juſtice: but if the *certiorari* be once filed, the proceedings below cannot be revived. An indictment, &c. cannot be ammended after it is filed.

FILIAL, ſomething belonging to the relation of ſon. See Son.

The divines uſually diſtinguiſh between a *ſervile* and a *filial* fear. The moſt abandoned may have a ſervile fear of God, ſuch as that of a ſlave to his maſter; but not a filial fear, i. e. a fear reſulting from love and reſpect.

FILIGRANE, or **Filigree**, *Work*, any piece of gold or ſilver work that is curiouſly done with grains or drops on the filaments or threads.

FILICACIA (Vincent), a celebrated Italian poet, was born at Florence in 1642. He was a member of the Academy della Cruſca and of that of the Arcadi, and became ſecretary to the duke of Tuſcany. He died in 1707. His poems are much eſteemed for the delicacy and nobleneſs of their ſentiments. Scipio de Filicacia, his ſon, had them all printed together, under the title of *Poeſie Foſiano di Vincenzo da Filicacia*, in 1707, 4to.

FILICES, (from *filum* "a thread," *quaſi filatim inciſa)*, Ferns; one of the ſeven tribes or families of the vegetable kingdom, according to Linnæus, by whom it is thus characterized: "having their fructification on the back ſide of the frondes." They conſtitute the firſt order in the claſs cryptogamia; and conſiſt of 16 genera, which are divided into *fructificationes ſpicatæ, frondoſæ, & radicales*. This order comprehends the entire xvi$^{\text{th}}$ claſs of Tournefort, in whoſe ſyſtem the filices make only a ſingle genus, in the firſt ſection of the above-mentioned claſs.

Filices, is alſo an order of plants in the *fragmenta methodi naturalis* of Linnæus. See Botany, p. 1317.

FILING, one of the principal operations in ſmithery, &c. ſucceeding to forging. See File.

The coarſer cut files are always to be ſucceeded by finer; and in all the kinds the rule is, to lean heavy on the file in thruſting it forward, becauſe the teeth of the file are made to cut forwards. But in drawing the file back again for a ſecond ſtroke, it is to be lightly lifted juſt above the work, by reaſon it cuts not coming back.

The rough or coarſe-toothed file (which, when large, is called a *rubber*) ſerves to take off the unevenneſſes of the work left by the hammer in forging.

The baſtard-toothed file is to take out too deep cuts, and file ſtrokes made by the rough file. The fine-toothed file takes out the cuts or file-ſtrokes the baſtard-file made; and the ſmooth file thoſe left by the fine file.

In this order, the files of ſeveral cuts are to ſucceed each other till the work is as ſmooth as it can be filed. After which it may be made yet ſmoother with emery, tripoli, &c. See Poliſhing.

FILIPENDULA, in botany. See Spiræa.

FILIX, in botany. See Filices.

FILLET, in anatomy. See Frœnum.

Fillet, or *Filet*, in architecture, a little ſquare member, ornament, or moulding, uſed in divers places and upon divers occaſions, but generally as a crowning over a greater moulding.

Fillet, in heraldry, a kind of orle or bordure, containing only a third or fourth part of the breadth of the common bordure. It is ſuppoſed to be withdrawn inwards, and is of a different colour from the field. It runs quite round, near the edge, as a lace over a cloak.

Fillet, in the manege, the loins of an horſe, which begin at the place where the hinder part of the ſaddle reſts.

FILLY, a term among horſe-dealers, to denote the female or mare colt.

FILM, a thin ſkin or pellicle. In plants, it is uſed for that thin, woody ſkin, which ſeparates the ſeeds in the pods, and keeps them apart.

FILTER, or **Filtre**, in chemiſtry, a ſtrainer commonly made of bibulous or filtering paper in the form of a funnel, through which any fluid is paſſed, in order to ſeparate the groſs particles from it, and render it limpid.

FILTER, is alſo a charm, ſuppoſed to have a virtue of inſpiring love. The word is derived from the Greek φιλτρον, which ſignifies the ſame thing, of φιλεω, *amo*, "I love."

FILTRATION. See CHEMISTRY, n° 69.

FIMBRIÆ, denotes appendages diſpoſed by way of fringe round the border of any thing.

FIMBRIATED, in heraldry, an ordinary with a narrow border or hem of another tincture.

FIN, in natural hiſtory, a well-known part of fiſhes, conſiſting of a membrane ſupported by rays, or little bony or cartilaginous officles.

The office of the fins has commonly been ſuppoſed to be analogous to that of feathers in fowls; and to aſſiſt the fiſh in its progreſſive motion, or ſwimming: but the later naturaliſts find this a miſtake.

The tail is the great inſtrument of ſwimming: the fins only ſerve to keep the fiſh upright, and prevent vacillation or wavering.

FINAL, in general, whatever terminates or concludes a thing; as *final* judgment, *final* ſentence, &c.

FINAL *Cauſe*. See CAUSE.

FINAL *Letters*, among the Hebrew grammarians, five letters ſo called, becauſe they have a different figure at the end of words from what they have in any other ſituation.

FINAL, in geography, a port-town of Italy, ſubject to Genoa, and ſituated on the Mediterranean, about 37 miles ſouth-weſt of that city. It was ſold to the Genoeſe, in 1713, by the emperor Charles VI. E. Long. 9. 12. N. Lat. 44. 30.

FINANCES, in the French policy, denote the revenues of the king and ſtate: much the ſame with the treaſury or exchequer of the Engliſh, and the fiſcus of the Romans.—The word is derived from the German *finantz*, "ſcraping, uſury." Tho' du Cange chooſes rather to deduce it from the barbarous Latin *financia, præſtatio pecuniaria*.

Council of the FINANCES, correſponds to our lords-commiſſioners of the treaſury: the comptroller-general of the *finances*, to our lord high treaſurer, &c.

The French have a peculiar kind of figures, or numeral character, which they call *chiffre de finance*.

FINCH-KIND, in ornithology, an appellation given to a genus of birds known among authors by the name of FRINGILLA.

FINCH (Heneage), earl of Nottingham, the ſon of Sir Heneage Finch, ſome time recorder of London, and of a younger branch of the Winchelſea family, was born in 1621. By his good parts and diligence, he became a noted proficient in the municipal laws; was made ſolicitor-general by Charles II. on his reſtoration, and was very active in the proſecution of the regicides. In 1670, he was appointed attorney-general; about three years after, lord keeper of the great ſeal, on the removal of the earl of Shafteſbury; and lord chancellor in 1675. He was created earl of Northampton in 1681; and died the year following, being quite worn out by the fatigues of buſineſs. He publiſhed ſeveral ſpeeches on the trials of the judges of king Charles I. with ſome few other things; and left behind him Chancery Reports in MS.

FINE, in law, hath divers applications. Sometimes it is uſed for a formal conveyance of lands or tenements, or of any thing inheritable, being *in eſſe temporis finis*, in order to cut off all controverſies. Others define it to be a final agreement between perſons, concerning any lands or rents, &c. of which any ſuit or writ is depending between them in any court.

FINE, ſometimes ſignifies a ſum of money paid for entering lands or tenements let by leaſe; and ſometimes a pecuniary mulct for an offence committed againſt the king and his laws, or againſt the lord of the manor.

Blackſt. Comment.

FINES *for Alienation*, in feodal law. One of the attendants or conſequences of tenure by vaſſalſhip. KNIGHT-*Service*, was that of fines due to the lord for every alienation, whenever the tenant had occaſion to make over his land to another. This depended on the nature of the feodal connection; it not being reaſonable nor allowed, that a feudatory ſhould transfer his lord's gift to another, and ſubſtitute a new tenant to do the ſervice in his own ſtead, without the conſent of the lord: and, as the feodal obligation was conſidered as reciprocal, the lord alſo could not aliene his ſeignory without the conſent of his tenant, which conſent of his was called an *attornment*. This reſtraint upon the lord ſoon wore away; that upon the tenant continued longer. For, when every thing came in proceſs of time to be bought and ſold, the lords would not grant a licence to their tenants to aliene, without a fine being paid; apprehending that, if it was reaſonable for the heir to pay a fine or relief on the renovation of his paternal eſtate, it was much more reaſonable that a ſtranger ſhould make the ſame acknowledgment on his admiſſion to a newly purchaſed feud. In England, theſe fines ſeem only to have been exacted from the king's tenants *in capite*, who were never able to aliene without a licence: but, as to common perſons, they were at liberty, by *magna charta*, and the ſtatute of *quia emptores*, (if not earlier), to aliene the whole of their eſtate, to be holden of the ſame lord as they themſelves held it of before. But the king's tenants *in capite*, not being included under the general words of theſe ſtatutes, could not aliene without a licence: for if they did, it was in ancient ſtrictneſs an abſolute forfeiture of the land; tho' ſome have imagined otherwiſe. But this ſeverity was mitigated by the ſtatute 1 Edw. III. c. 12. which ordained, that in ſuch caſe the lands ſhould not be forfeited, but a reaſonable fine be paid to the king. Upon which ſtatute it was ſettled, that one third of the yearly value ſhould be paid for a licence of alienation; but, if the tenant preſumed to aliene without a licence, a full year's value ſhould be paid. Theſe fines were at laſt totally taken away by ſtatute 12 Car. II. c. 24. See KNIGHT-*Service*.

FINE-*Drawing*, or *Rentering*, a dexterous ſewing up or rejoining the parts of any cloth, ſtuff, or the like, torn or rent in the dreſſing, wearing, &c.

It is prohibited to *fine-draw* pieces of foreign manufacture upon thoſe of our own, as has formerly been practiſed. See RENTERING.

FINERS *of* GOLD *and* SILVER, are thoſe who ſeparate theſe metals from coarſer ores. See REFINERS.

FINERY, in the iron-works, one of the forges at which the iron is hammered and faſhioned into what they call a *bloom*, or *ſquare bar*.

FINGAL, a Caledonian chief, the hero of Oſſian, flouriſhed about the end of the third century. Vid. *Oſſian's Poems*.

FINGERS, in anatomy, the extreme part of the hand divided into five members.

FINING *of* LIQUORS. See CLARIFICATION.

FINISTERRA, the moſt weſterly cape or promontory of Spain, in 10. 15. W. Long. and 43° N. Lat. This cape is likewiſe the moſt weſterly part of the continent of Europe.

FINITE, ſomething bounded or limited, in contradiſtinction to INFINITE.

FINLAND (the duchy of), is bounded on the weſt by the gulph of Bothnia, on the eaſt by Muſcovy, on the ſouth by the gulph of Finland and Ingria, and on the north by Bothnia and Lapland. It is about 200 miles in length, and almoſt as much in breadth. It contains many lakes; in which are ſeveral iſlands, which are generally rocks or inacceſſible mountains. The inhabitants are ſmall of ſtature, capable of enduring hardſhips, and good ſoldiers. The Ruſſians have for ſome time rendered themſelves maſters of a good part of this province; the reſt belongs to Sweden. It is divided into ſeven provinces: 1. Finland; 2. Cajana; 3. Thavaſthia; 4. Nyeland; 5. Savolaxia; 6. Carelia; and, 7. Kexholmia.

Finland Proper is an agreeable country, and lies over-againſt the city of Stockholm, near the place where the gulphs of Bothnia and Finland meet. It is divided into South and North Finland. It is diverſified with mountains, foreſts, lakes, meadows, and pleaſant fields. The inhabitants ſalt the fiſh they do not conſume themſelves, and ſend it into foreign countries.

FIR-TREE, in botany. See ABIES.

FIRE is that ſubtle, inviſible, ſubſtance, by which all bodies are expanded, or enlarged in their dimenſions, and then become hot to the touch; fluid ſubſtances of every kind are carried off in vapour; ſolid bodies become luminous, and are likewiſe diſſipated in vapour, or, if incapable of being evaporated, become fluid, and at laſt are converted into glaſs. It ſeems likewiſe to be the chief agent in nature, on which animal and vegetable life have an immediate dependence, and without which it doth not appear that the ſyſtem of nature itſelf could ſubſiſt a ſingle moment.

1
Opinion of lord Bacon concerning fire.

No queſtion in natural philoſophy ſeems more difficult to be reſolved than that concerning the nature of fire, and none has been more agitated. One ſet of philoſophers, amongſt whom are Lord Bacon, Mr Boyle, Sir Iſaac Newton, &c. aſſert, that fire is not any ſubſtance of itſelf diſtinct from terreſtrial bodies, but that it conſiſts only in a vehement vibratory motion of their parts. Hence, lord Bacon defines heat, by which he means fire itſelf, to be "an expanſive undulatory motion in the minute particles of a body, whereby they tend with ſome rapidity towards the circumference, and at the ſame time tend a little upwards." From this he infers, that if in any natural body you can excite a motion whereby it ſhall expand or dilate itſelf, and can repreſs and direct this motion upon itſelf, in ſuch a manner, that the motion ſhall not proceed uniformly, but obtain in ſome parts and be checked in others, you will generate heat, or fire.

2
Of Mr Boyle.

To the ſame purpoſe Mr Boyle argues in a treatiſe on the mechanical origin of heat and cold. "In the production of heat, (ſays he,) there appears nothing on the part either of the agent or patient, but motion, and its natural effects. When a ſmith briſkly hammers a ſmall piece of iron, the metal thereby becomes exceedingly hot: yet there is nothing to make it ſo, except the forcible motion of the hammer impreſſing a vehement and variouſly determined agitation on the ſmall parts of the iron; which, being a *cold* body before, grows, by that ſuperinduced commotion of its ſmall parts, *hot*—firſt, in a more looſe acceptation of the word, with regard to ſome other bodies with which it was cold before: then ſenſibly hot, becauſe this agitation exceeds that of the parts of our fingers: and, in this inſtance, oftentimes the hammer and anvil continue cold after the operation; which ſhews, that the heat acquired by the iron was not communicated by either of thoſe implements as heat; but produced in it by a motion great enough ſtrongly to agitate the parts of ſo ſmall body as the piece of iron, without being able to have an effect upon ſo much greater maſſes of metal as the hammer or anvil. Though, if the percuſſions were often and briſkly renewed, and the hammer were ſmall, this alſo might be heated. Whence it is not neceſſary that a body ſhould itſelf be hot to give heat.

"If a large nail is driven by a hammer into a plank of wood, it will receive ſeveral ſtrokes on its head ere it grow hot; but when it is once driven to the head, a few ſtrokes ſuffice to give it a conſiderable heat: for while, at every blow of the hammer, the nail enters further into the wood, the motion produced is chiefly progreſſive, and is of the whole nail tending one way; but when that motion ceaſes, the impulſe given by the ſtroke, being unable to drive it further on, or break it, muſt be ſpent in making a various, vehement, and inteſtine commotion of the parts among themſelves, wherein the nature of heat conſiſts."

3
Of Sir Iſaac Newton.

Sir Iſaac Newton conjectures, that the ſun and ſtars are only great earths vehemently heated: for large bodies, he obſerves, "preſerve their heat the longeſt, their parts heating one another; and why may not great, denſe, and fixed bodies, when heated beyond a certain degree, emit light ſo copiouſly, as by the emiſſion and reaction thereof, and the reflections and refractions of the rays within the pores, to grow continually hotter, till they arrive at ſuch a period of heat as is that of the ſun? Their parts may be further preſerved from fuming away, not only by their fixity, but by the vaſt weight and denſity of the atmoſphere incumbent on them, ſtrongly compreſſing them, and condenſing the vapours and exhalations ariſing from them. Thus we ſee, that warm water, in an exhauſted receiver, ſhall boil as vehemently as the hotteſt water open to the air; the weight of the incumbent atmoſphere, in this latter caſe, keeping down the vapours, and hindering the ebullition, till it has received its utmoſt degree of heat. So alſo a mixture of tin and lead, put on a red-hot iron *in vacuo*, emits a fume and flame; but the ſame mixture in the open air, by reaſon of the incumbent atmoſphere, does not emit the leaſt ſenſible flame."

Agreeable to this, Sir Iſaac is of opinion, that "groſs bodies may be converted into light, by the agitation of their particles ; and light, again, into groſs bodies, by being fixed therein :" and he defines fire to be " a body heated ſo hot, as to emit light copiouſly; for what, (ſays he,) is a red-hot iron, but fire ?"

4 Of Doctor Graveſande, Boerhaave, &c.

By others, fire is conſidered as a fluid *ſui generis*, an original element, which " exiſts in all bodies, and may be ſeparated or procured from them by rubbing them againſt each other, and thus putting their fire in motion. But this motion by no means generates the fire." This is the account given by Dr s'Graveſande ; with whom Lemery agrees, and endeavours to prove, that it is equally diffuſed through all ſpace, is preſent in all places, in the void ſpaces between bodies, as well as the inſenſible interſtices between their parts : of which opinion alſo was Dr Boerhaave.

5 Objections againſt the mechanical origin of fire.

The firſt hypotheſis having been adopted by ſuch an eminent philoſopher as Sir Iſaac Newton, hath from thence received very conſiderable weight, and been generally received by the philoſophers in this country. It is, nevertheleſs, preſſed with almoſt inſurmountable difficulties. It can by no means be explained upon the principles of mechaniſm, becauſe it directly contradicts them.—It is certain, that if one body gives motion to another that reſiſts it, the quantity of motion produced will be leſs than that of the firſt body ; becauſe as much will be taken off as the reſiſtance of the firſt body was equal to. Thus, ſuppoſe a body moves in ſuch a manner as to be able to raiſe 12 pounds ; if it meets with an obſtacle equivalent to ſix pounds, it will not, after driving it out of the way, be able to raiſe any more than ſix pounds. The ſame rule muſt hold equally, whether we ſuppoſe the parts of matter in motion to be large or ſmall. In the above example, if we take ounces inſtead of pounds, we cannot ſuppoſe that the effect will be in the leaſt diſproportionate. If inſtead of ounces we take grains, or half grains, or the minuteſt particles, the effect muſt ſtill be the ſame. Let us now take Mr Boyle's example of iron becoming red-hot by being hammered. The *momentum* or quantity of motion impreſſed on the iron, by the blows it receives from the hammer, cannot be very great ; we ſhall ſuppoſe them all together to amount to 500 pound weight. The momentum of the ſmall particles of fire ſo produced, muſt be ſomething leſs than 500 pound, on account of the reſiſtance of them to motion. If theſe particles ſo put in motion, are employed to put in motion the particles of other matter, the momentum of theſe muſt be ſtill leſs than that of the iron, on account of the new reſiſtance met with. Thus, on every acceſſion of new fuel, the fire muſt decay, and at laſt be quite extinguiſhed. For, let us ſuppoſe the quantity of motion originally communicated to be great or ſmall : if one part of matter gives motion to another, and that to a third, and ſo on, there is a conſtant loſs of motion, occaſioned by the reſiſtance of the parts to be moved ; and let us ſuppoſe this reſiſtance as ſmall as we pleaſe, as long as it is a reſiſtance, an increaſe of the fire muſt be impoſſible. The contrary to all this, however, is confirmed by daily experience ; and there ſeems to be no limit to the increaſe of fire, but the want of fuel. We cannot therefore mechanically account for the origin of fire merely on thoſe principles by which we account for the motions of gravitating bodies.

To obviate in ſome meaſure objections of this kind, Sir Iſaac Newton ſeems to have ſuppoſed, that every particle of matter is endowed with a ſphere of attraction, and beyond that with a ſphere of repulſion. Hence, as ſoon as two particles of matter get without the ſphere of one another's attraction, they begin to repel each other very ſtrongly: and hence, ſays he, " as in algebra, where affirmative quantities ceaſe, negative ones begin ; ſo in mechanics, where attraction ceaſes, there the repelling power muſt ſucceed."

Upon this principle of repulſion alone it is that the mechanical origin of heat is tenible : for if the minute particles of any body have a force impreſſed upon them, in ſuch a manner as to put them without the ſphere of each other's attraction, and then they begin to repel one another ſtrongly, it may be ſuppoſed, that putting the parts of other matter in a ſimilar ſituation, and theſe again acting upon others in a like manner, a large maſs of matter might be reſolved into its minuteſt particles, and theſe ſcattered to an immenſe diſtance by the mutual repelling power between them, and thus produce the phenomena of heat and light.

Even this will be found quite unſatiſfactory, if attentively examined ; for the repelling power with which theſe particles are ſuppoſed to be endowed, will have as great a tendency to drive them back upon the body from whence they came, as to drive them away from it. To help our conceptions in this matter, let us ſuppoſe, that the repulſive ſphere round each of the minute particles is an inch in diameter. Let us alſo ſuppoſe, that this repulſive force is ſufficiently great to throw the particle to the diſtance of 1000 miles, when it comes within the repulſive power of another. If, therefore, a particle is driven off from any hard ſubſtance, ſuppoſe iron, it will indeed drive another before it, which is already in the way, but will as certainly drive back upon the iron thoſe which are ſhaken off from it afterwards : for re-action is always equal to action; and if we ſuppoſe a number of ſuch particles extricated from the body, their mutual action and re-action being always equal, the motion among them muſt very ſoon ceaſe.

Upon this principle, however, the Newtonians explain the emiſſion of light from luminous bodies. " A ray of light (ſays Sir Iſaac), as ſoon as it is caſt off from the luminous body by the vibrating motion of its parts, and is got out of the ſphere of its attraction, is propelled with an immenſe velocity."—Now, with all due ſubmiſſion to ſuch a great name as that of Sir Iſaac Newton, what he advances here is utterly impoſſible. All the parts of the ſun have a mutual attraction towards one another, by which they are kept together; and it is impoſſible that a particle of matter can be both attracted and repelled at the ſame moment by one body.—It is indeed inconceivable, how the particles of matter can be endowed with two ſuch contrary powers, and yet remain together in one maſs; for though thoſe which lie contiguous to one another may mutually attract, yet they muſt alſo repell, and be repelled by, thoſe which lie at a greater diſtance; and, from ſuch a mixture of contrary forces, it does not ſeem that any body could ſolidly cohere together.

In ſupport of this hypotheſis, we may however ſuppoſe, that the vibratory motion of the parts of the ſun is ſo great, that the particles of light are thrown off by it an immenſe way beyond the orbit of Saturn. But granting this, no ſooner would they come within the ſphere of one another's repulſion, than ſome of them would be thrown back with violence towards the ſun; and, in their return, would meet with others, to which they would give a like direction; and in this they would be aſſiſted by the attractive force of the ſun himſelf, by which means the force with which the light was emitted, muſt at firſt be reſiſted, and at laſt entirely deſtroyed.

But, whatever might be the caſe with the ſun, the vibratory force of whoſe parts we may ſuppoſe to be inconceivably great, it is impoſſible that upon this principle any fire could be kindled by man: for the vibratory motion induced among the particles of any body by him, could never be greater than the force originally applied; and thus muſt unavoidably decay, on account of the continual reſiſtance met with in ſetting the particles of other matter in the like motion.

To theſe objections we may alſo add, that, upon this hypotheſis, fire ought to burn beſt *in vacuo;* becauſe there the preſſure of the atmoſphere is taken off, and there ſhould be the leſs reſiſtance to the vibrations of the ſmall particles. We find, however, that fire, ſo far from burning beſt *in vacuo*, is immediately extinguiſhed; and that a free circulation of air is abſolutely neceſſary to preſerve it.—Profeſſor Hamilton, indeed, of the univerſity of Dublin, endeavours to account for this, by ſaying, that air is neceſſary only to blow off the aſhes, &c. which would prevent the continuance of the motion. But if there were no other occaſion for air than this, fixed or phlogiſticated air would anſwer the ſame purpoſe; and both of theſe are found to extinguiſh fire. See Air.

6 Whether the true pabulum of fire is contained in the air.

The property, indeed, that air hath of ſupporting fire, has generally induced people to think that the true *pabulum* or fuel of fire is contained in the air.—Others are by no means inclined to admit this hypotheſis; but no concluſive argument hath yet been brought againſt it. Indeed, in a caſe where the agents are ſo exceedingly ſubtile, it ſeems impoſſible to prove the negative in this queſtion. We ſee, that fire will not burn without air; therefore air brings continually a new ſupply of matter which is converted into fire. Our ſenſes here give us poſitive evidence. Thoſe who take the other ſide of the queſtion, ought to bring a proof equally ſtrong againſt this. Dr Hamilton, indeed, *ſuppoſes* fire to be otherwiſe ſufficiently provided with pabulum; and, therefore, that air acts upon fire otherwiſe than by ſupplying it with fuel, as we have already hinted.

7 Dr Hamilton's opinion.

"Air (ſays he) is not leſs neceſſary for the ſupport of fire than of animal-life; for fire will not long continue to burn without a circulation of air. Now, *I ſuppoſe*, this happens, not from its adding any thing to the pabulum of fire, (for fire ſeems to be otherwiſe ſufficiently provided with pabulum), but rather on this account, That the air immediately about a body on fire is heated, and made ſpecifically lighter than the air at ſome diſtance from it. This hot air, therefore, muſt aſcend, and carry with it all thoſe minute particles of different kinds which are thrown off from the burning body, and which would otherwiſe reſt upon its ſurface, and thereby clog and ſtop the ſubtile vibrations of the burning matter, in which the nature of fire partly conſiſts. If, therefore, fire be confined in a cloſe place, where there can be no circulation of air, the air about it, being ſoon ſaturated with the particles ariſing from the burning matter, will not be able to take up any more of them; and therefore the fire muſt go out, ſmothered, as it were, with ſuch particles as are no longer combuſtible. Hence it is that fire burns faſter when air is ſtrongly blown upon it: for then the aſhes are carried off as faſt as they are formed on the ſurface of the burning body; and thereby the particles that have juſt taken fire, are kept quite free from every thing that can impede or clog their vibratory motion. The air in this caſe alſo will ſpread the fire quickly through the fuel, by blowing the particles that are already kindled, among thoſe that are not; and perhaps the motion of the air in this caſe may promote the ſubtile vibrations in the burning matter by which the fire is propagated through its parts. As the air contains many ſubtile particles of the inflammable kind, it is not improbable, that theſe, mixing with the groſs burning matter, may help to preſerve and enliven the fire: but I think it moſt probable, that air ſupports fire chiefly by carrying off ſuch particles as are burned out, and would therefore obſtruct the progreſs of the fire; becauſe we find, that the ſtrong elaſtic ſteam of water driven violently out of the pipe of an æolipile, which will carry off thoſe particles, will alſo blow up and increaſe the fire as well as air driven from the bellows, although the ſteam does not contain any inflammable particles."

8 Deception in his reaſoning.

Here we have no other reaſon given in ſupport of this hypotheſis, than that fire may be blown up by the ſteam iſſuing violently from an æolipile; but this reaſon is founded on a deception. This ſteam only blows up the fire by occaſioning a violent motion in the air through which it paſſes; and thus forcibly drives it on the fuel, at the ſame time that it enters along with it; and thus is, in ſome meaſure, ſimilar to the blowing up of a large fire by a ſtream of water, which is uſed in ſome places inſtead of bellows. Nevertheleſs, if the ſteam of the æolipile is only admitted to the fire, and the air totally excluded from it, the fire will be as effectually extinguiſhed as if the ſtream of water employed to force the air into a large furnace was itſelf directed on the fuel.—Beſides, on the Doctor's hypotheſis, fixed, and many other kinds of air ought to be equally efficacious in preſerving flame, as already obſerved; which are yet found to extinguiſh it as effectually, if not more ſo than water.

9 Hutchinſonian hypotheſis.

Among other hypotheſes, it may not be amiſs to mention the almoſt forgotten and exploded one publiſhed by Mr Hutchinſon, and by him pretended to be plainly revealed in the ſacred writings.—According to this gentleman, the nature of fire, of light, and air, are all at bottom the ſame, being only three different modifications of the ſame fluid. When air is blown upon a fire, then the groſſer fluid is immediately reduced to its fineſt parts, and attains the utmoſt degree of poſſible fluidity, by the vehement attrition of its own particles, and thoſe of the fire already kindled, againſt one another. Being continually preſſed upon in this ſtate by the ſurrounding groſs air, it is ſent out on all ſides in ſtreams of light, which being detained among the particles of the atmoſphere, and having their motion ſtopped, become part of the air itſelf, and are again ready to reaſſume their luminous and fiery appearance on proper occaſions.

Setting aſide the pretended authority of revelation, many people have been of opinion, that this hypotheſis might be ſupported by very ſtrong arguments drawn from matter of fact. The principal are the following.

10 Arguments in favour of this opinion

1. It is well known, that in all mixtures of different kinds of fluids, thoſe which are rareſt, and conſequently leſs acted upon by the force of gravity than others, will riſe to the top, and occupy the uppermoſt place in the mixture. Thus, if water and oil are mixed together, they will ſoon ſeparate themſelves, and the oil will ſwim at the top. This ſeparation happens in conſequence of their different degrees of denſity, by which the oil is leſs affected by the force of gravity than the water; not through any principle of *innate levity*, or any power of repulſion between this fluid and the bottom of the veſſel. In like manner, when we ſee any other two fluids mixed, and one of them aſcends, we ought not to conclude, that there is any unknown power of repulſion in that which aſcends, more than in the other. If only one of the two fluids is viſible, and that happens to be the aſcending one, we ought not therefore to ſeek for the cauſe of its aſcent in unknown and imaginary repulſions and vibrations, but rather to conclude that it is preſſed upwards by the tendency of an inviſible fluid of greater denſity downwards. In moſt caſes this is allowed by all philoſophers to hold good. The ſmoke of a fire, for inſtance, does not aſcend from it, on account of any principle of poſitive levity, or on account of a repulſive power betwixt it and the fire from which it aſcends, but from the greater tendency of the air downwards; in conſequence of which, it is driven upwards with a force equivalent to the difference of their ſpecific gravities. By analogy, (ſay they) we ought to apply this to the emiſſion of light itſelf. We have no other proof of a repulſive power between the particles of this ſubſtance, than its conſtant aſcent from a luminous body; and invent it in order to ſolve this phenomenon, when the ſame thing may be done with a much greater degree of probability, and more agreeable to the known laws of nature in other caſes, by ſuppoſing the deſcent of a denſer, though inviſible, fluid towards that body.

2. It can be proved by experiment, that the matter of fire, or light, is convertible into a denſer ſubſtance, ſubject to the laws of gravitation, and united to terreſtrial bodies in ſuch a manner as to become a part of their compoſition, while yet it is capable of being afterwards expelled by a renewal of heat, and of reappearing in the form of air.—The proof here reſts upon the augmentation of weight obſerved in metals, when calcined either in the ſolar beams by means of a burning glaſs, or in a common fire. Thus, regulus of antimony, calcined in the focus of a large burning-glaſs, gains almoſt an eighth part of its whole weight; red lead, in calcination, gains a tenth part; and ſome of the other metals have been obſerved to gain much more. When theſe calces are ſuffered to cool, and are again expoſed to the action of a ſtrong fire, they diſcharge a large quantity of air. The fire, therefore, ſay the adopters of this hypotheſis, has here been evidently converted into air; it being impoſſible that, during the continuance of a violent heat, any thing could be imbibed from the air; for the fire would as effectually prevent any ſuch abſorption at firſt, as it could expel the air afterwards.

3. The phenomena of electricity ſhow, that there is preſent between the groſſer parts of bodies an inviſible ſubtile fluid, of exceeding great power, which on certain occaſions becomes viſible, and then diſcovers itſelf to be the real element of fire itſelf. It always appears to our eyes as a ſtream of ſubtile fire, emitting a very perceptible light. It will kindle inflammable ſubſtances; melt the moſt difficultly fuſed metals, platina itſelf not excepted; and even turn gold into glaſs, which hath never yet been done either by the fierceſt furnace or the ſtrongeſt burning mirror.

Though this hypotheſis has been laid down in its moſt diſtinct and plauſible form by Hutchinſon, or rather ſome of his followers, it appears very little if at all different from that of Boerhaave and others, who maintain the impoſſibility of generating fire, and affirm it to be a fluid *ſui generis*. A direct proof of this, however, as well as of other ſuppoſitions concerning the nature of fire, is attended with great difficulties. Were we able to convert fire by itſelf into air, and convert air by itſelf into fire, the point would indeed be gained. But, though we blow ever ſo much air into a fire, unleſs we continually add new fuel, it will ſoon be extinguiſhed. But this ought not to be the caſe on the Hutchinſonian hypotheſis: for one quantity of air being reduced to its utmoſt degree of fluidity, ought to reduce to the ſame ſtate every ſucceeding quantity which mixed itſelf with it; and not only would fire be kept up without any groſs fuel, but there might be ſome danger of ſetting the whole atmoſphere in a blaze at once.

11 Difficulties attending this hypotheſis.

Thus, while one party is at a loſs to account for the uſefulneſs of *air* in ſupporting fire, the other is no leſs diſtreſſed with the groſs fuel, ſuch as wood, coals, &c. which ſeem to be equally neceſſary with the air itſelf for the ſupport of our fires. The Hutchinſonians, indeed, find no other uſe for the fuel but to keep off too great a quantity of air, which would oppreſs and extinguiſh a ſmall fire: but this purpoſe might be equally well anſwered by pieces of brick or ſtone; yet theſe will effectually put out a fire. The uſe of the fuel, therefore, which is continually to be added to our common fires, cannot be explained on the Hutchinſonian hypotheſis.

12 It is totally overturned by Dr Prieſtley's experiments.

The diſcoveries of Dr Prieſtley, however, have put the matter beyond a doubt with reſpect to air. He hath made it apparent, that terreſtrial ſubſtances are neceſſary ingredients in the compoſition of air much purer than what we breathe, and much more capable of ſuſtaining flame*; ſo that it is now an abſurdity to talk of fire and air being convertible into one another.

The great proof on the Hutchinſonian ſide, and which they look upon as abſolutely unanſwerable, is the increaſe of weight in metalline calces when expoſed to the action of a ſtrong fire. This increaſe is found to be owing to air, as we have already mentioned: and though it ſhould by no means be found either fit for reſpiration, or for the purpoſes of ſupporting flame; yet it will be ſufficient for their purpoſe to prove, that the element of fire is capable of being converted into a gravitating ſubſtance; which, when diſengaged, appears in the form of a permanently elaſtic fluid, and thus becomes a certain ſpecies of air.—That it really doth ſo, however, is very dubious: for it is certain, that metals cannot be calcined without the free acceſs of air; and therefore it cannot certainly be known whether the air in the calx comes from the fixation of the fire, or whether it is attracted from the ſurrounding atmoſphere, eſpecially if, as ſome alledge, the calx receives no increment in weight while kept hot.

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* See *Air*.

13 And by thoſe of M. La Voiſier.

M. la Voiſier mentions ſome very fine experiments with regard to the calcination of metals, which ought to throw a conſiderable light on this ſubject.—Having put three drachms of lead in a ſtone crucible placed under a glaſs-receiver inverted in quickſilver, he expoſed it to one of Tſchirnhauſen's great burning-glaſſes; keeping it, however, a full inch from the true focus, that the heat might not be much greater than was neceſſary to melt the metal.

At the very inſtant the lead melted, though it was perfectly clean and bright on every ſide, a pellicle was produced on its ſurface. In the progreſs of the calcination, this pellicle became of a yellow maſſicot colour, and wrinkled on one ſide. In ten or twelve minutes the calcination ſtopped, and no farther effect was obſerved; only when the heat was a little ſtronger, the yellow pellicle fuſed in ſome places, and formed a yellowiſh glaſs. From the portions thus vitrified fumes aroſe plentifully, which tarniſhed the top of the cucurbit. This evaporation he oppoſed as much as poſſible, by removing the lead farther and farther from the true focus of the lens.

The metal having been expoſed to the action of this lens for an hour and 15 minutes, and the veſſels then perfectly cooled, it was found to have gained $2\frac{1}{2}$ grains. The mercury was found to have gained $2\frac{1}{2}$ lines above its former level. The diameter of the receiver in that place was $4\frac{8}{10}$ inches, ſo that the whole quantity of air abſorbed was $3\frac{1}{4}$ cubic inches. The proportion of the increaſe of weight in the calx then, had been $\frac{2}{3}$ of a grain for each inch of air, which is about one fourth more than the weight of an equal quantity of atmoſpherical air. Having made ſome experiments on the air which remained in the receiver, he found that it would not precipitate lime-water, and thus ſeemed to be deprived of its fixed part.

To the ſame purpoſe Dr Prieſtley hath made experiments on metallic calcinations; and acquaints us, that if a metal is calcined over lime-water, it doth not become turbid; becauſe, though the calcareous earth attracts the fixed air, yet the metallic calx doth it much more ſtrongly, and conſequently no precipitation can enſue. The ſame reaſon he gives why metals cannot be calcined in nitrous air; namely, that there is then no fixed air with which the metallic calx may combine, and upon which the calcination ſeemed to him to depend; nevertheleſs, the metals fumed copiouſly, though the phlogiſton was not ſeparated.

Theſe experiments ſeem totally unanſwerable by the Hutchinſonians. It is well known, that fixed air is one of the component parts of our atmoſphere; and from Mr la Voiſier's and Dr Prieſtley's experiments, it would ſeem impoſſible to deprive a metal of its phlogiſton, but by allowing the calx to combine with fixed air; and as the fire, though conſtantly applied, is not able to produce this fixed air, but muſt have the aſſiſtance of the common atmoſphere, this ſeems a demonſtration, that fire is not convertible into an elaſtic fluid of any kind.

The only reply which the Hutchinſonians can give to this is, that metals will be increaſed in weight tho' kept over the fire in cloſe veſſels. But this may very reaſonably be ſuppoſed to proceed from the ſmall quantity of air contained in the veſſels where they are put, or from ſome inacuracy in cloſing them, ſo that there may be ſome communication between the metals and the external air. To make theſe experiments perfect, the glaſſes ought firſt to be well exhauſted of their air, and then hermetically ſealed.

It doth not appear, therefore, that ever the element of fire hath been by human art converted into a groſſer fluid of any kind; and conſequently the only reſource left the Hutchinſonians is in arguments drawn from the ſimilarity of the electric fluid and the ſubſtance of light or fire. The late diſcoveries in electricity, indeed, have thrown ſo much light upon that ſubject, that there are now but few who deny the exiſtence of fire as a diſtinct element. It doth not, however, appear, that this element can ever be converted into any other fluid of a groſſer nature, as the Hutchinſonians affirm. The electric fluid ſeems to be equally ſubtile, and equally penetrating, with fire or light; and though it ſhould remain ever ſo long at reſt, it doth not appear that its fluidity is thereby loſt in the ſmalleſt degree. But for a full account of the experiments moſt likely to aſcertain the identity of elementary and electric fire, ſee the articles ELECTRICITY, HEAT, IGNITION, LIGHT, &c.

Wild FIRE, a kind of artificial or factitious fire, which burns even under water, and that with greater volence than out of it.

It is compoſed of ſulphur, naphtha, pitch, gum, and bitumen; and is only extinguiſhable by vinegar mixed with ſand and urine, or by raw hides.

Its motion or tendency is ſaid to be contrary to that of natural fire, and always follows the direction in which it is thrown; whether it be downwards, ſidewiſe, or otherwiſe. The French call it *Greek fire*, or *feu Gregeois*, becauſe firſt uſed by the Greeks, about the year 660; as is obſerved by the Jeſuit Petavius, on the authority of Nicetas, Theophanes, Cedrenus, &c.

The inventor, according to the ſame Jeſuit, was an engineer of Heliopolis, in Syria, named *Callinicus*, who firſt applied it in the ſea-fight commanded by Conſtantine Pogonates againſt the Saracens, near Cyzicus, in the Helleſpont; and with ſuch effect, that he burnt the whole fleet therewith, wherein were 30,000 men.

But others will have it of a much older date; and hold Marcus Gracchus the inventor: which opinion is ſupported by ſeveral paſſages, both in the Greek and Roman writers, which ſhew it to have been anciently uſed by both thoſe nations in their wars. See *Scaliger* againſt *Cardan*.

Conſtantine's ſucceſſors uſed it on divers occaſions, with equal advantage as himſelf; and what is remarkable enough, is, that they were ſo happy as to keep the ſecret of the compoſition to themſelves, ſo that no other nation knew it in the year 960.

Hugh, king of Burgundy, demanding ſhips of the emperor Leo, for the ſiege of Freſne, deſired likewiſe the Greek fire. Chorier *Hiſt. de Dauph.*

F. Daniel gives us a good deſcription of the Greek fire, in his account of the ſiege of Damietta under St Louis. Every body, ſays that author, was aſtoniſhed with the Greek fire, which the Turks then prepared; and the ſecret whereof is now loſt. They threw it out of a kind of mortar; and ſometimes ſhot it with an odd ſort of croſs-bow, which was ſtrongly bent by means of a handle, or winch, of much greater force than the mere arm. That thrown with the mortar, ſometimes appeared in the air of the ſize of a tun, with a long tail, and a noiſe like that of thunder. The French by degrees got the ſecret of extinguiſhing it; in which they ſucceeded ſeveral times.

Ann. Reg. xviii. 117.

Machine for Preſerving from Fire. This machine, conſiſts of a pole, a rope, and a baſket. The pole is of fir, or a common ſcaffold pole, of any convenient length from 36 to 46 feet; the diameter at bottom, or greateſt end, about five inches; and at the top, or ſmalleſt end, about three inches. At three feet from the top is a mortiſe through the pole, and a pulley fixed to it of nearly the ſame diameter with the pole in that part. The rope is about three quarters of an inch diameter, and twice the length of the pole, with a ſpring hook at one end, to paſs through the ring in the handle of the baſket when uſed: it is put through the mortiſe over the pulley, and then drawn tight on each ſide to near the bottom of the pole, and made faſt there till wanted. The baſket ſhould be of ſtrong wicker-work, three feet and a half long, two feet and a half wide, rounded off at the corners, and four feet deep, rounding every way at the bottom. To the top of the baſket is fixed a ſtrong iron curve or handle, with an eye or ring in the middle; and to one ſide of the baſket, near the top, is fixed a ſmall cord, or guide-rope, of about the length of the pole. When the pole is raiſed, and ſet againſt a houſe over the window from which any perſons are to eſcape, the manner of uſing it is ſo plain and obvious, that it needs not be deſcribed. The moſt convenient diſtance from the houſe, for the foot of the pole to ſtand, where practicable, is about 12 or 14 feet. If two ſtrong iron ſtraps, about three feet long, rivetted to a bar croſs, and ſpreading about 14 inches at the foot, were fixed at the bottom of the pole, this would prevent its turning round or ſlipping on the pavement. And if a ſtrong iron hoop, or ferule, rivetted (or welded) to a ſemi-circular piece of iron ſpreading about 12 inches, and pointed at the ends, were fixed on at the top of the pole, it would prevent its ſliding againſt the wall.

When theſe two laſt mentioned irons are fixed on, they give the pole all the ſteadineſs of a ladder; and becauſe it is not eaſy, except to perſons who have been uſed to it, to raiſe and ſet upright a pole of 40 feet or more in length, it will be convenient to have two ſmall poles, or ſpars, of about two inches diameter, fixed to the ſides of the great pole at about two or three feet above the middle of it, by iron eyes rivetted to two plates, ſo as to turn every way; the lower end of theſe ſpars to reach within a foot of the bottom of the great pole, and to have ferules and ſhort ſpikes to prevent ſliding on the pavement, when uſed occaſionally to ſupport the great pole, like a tripod. There ſhould be two ſtrong aſh trundles let through the pole, one at four feet and one at five feet from the bottom, to ſtand out about eight inches on each ſide, and to ſerve as handles, or to twiſt the rope round in lowering a very heavy weight. If a block and pulley were fixed at about the middle of the rope, above the other pulley, and the other part of the rope made to run double, it would diminiſh any weight in the baſket nearly one half, and be very uſeful in drawing any perſon up, to the aſſiſtance of thoſe in the chambers, or for removing any effects out of a chamber, which it might be dangerous to attempt by the ſtairs.

It has been proved, by repeated trials, that ſuch a pole as we have been ſpeaking of can be raiſed from the ground, and two or three perſons taken out of the upper windows of an houſe and ſet down ſafely in the ſtreet, in the ſpace of 35 ſeconds, or a little more than half a minute. Sick and infirm perſons, women, children, and many others, who cannot make uſe of a ladder, may be ſafely and eaſily brought down from any of the windows of an houſe on fire by this machine, and, by putting a ſhort pole through the handles of the baſket, may be removed to any diſtance without being taken out of the baſket. The pole muſt always have the rope ready fixed to it, and may be conveniently laid up upon two or three iron hooks under any ſhade or gate-way, and the baſket ſhould be kept at the watch-houſe. When the pole is laid up, the two ſpars ſhould always be turned towards the head of it. The baſket ſhould be made of peeled rods, and the pole and ſpars painted of a light ſtone-colour, to render it more viſible when uſed in the night.

Godfrey's Machines for Extinguiſhing Fire. Of theſe the following account is given by Mr Ambroſe Godfrey, grandſon to the inventor. "The machine to be employed, conſiſts of a ſmall portion of gun-powder cloſely confined; which, when animated by fire, acts by its elaſtic force, upon a proper medium, and not only divideth it into the minuteſt atoms, but diſperſeth it alſo in every direction, ſo as immediately to extinguiſh any fire within a certain diſtance. This medium is a liquor ſtrongly impregnated with a preparation of antiphlogiſtic principles, which, by their action upon burning materials, extinguiſh the flames, and reduce them in general to a ſtate of a black coal; and, by its oppoſite nature to fire, hinders the remaining ſparks, notwithſtanding the admiſſion of the air, from kindling the flames afreſh. By this means, the great point is obtained, in giving ſufficient time for totally extinguiſhing any remains of fire.

"They who preſume that water only will perform this, will find themſelves greatly miſtaken, as the draught of air will certainly rekindle the neighbouring materials, which are very fit to receive a freſh flame, the fire not being extinguiſhed by the quantity of water, but rather by the expanſion and rarefaction of its particles. There are ſeveral ſizes of theſe machines, from five to fifty pounds weight, in a portable and rather ſmall compaſs, and may generally be carried to any place where a man can go himſelf.

"But tho' theſe machines will prevent great fires by a timely application, they will not extinguiſh them after they have reached a frightful height, and ſeveral houſes, perhaps near a whole ſtreet, are in flames. The floors muſt be ſtanding, and acceſs to the building ſafe, otherwiſe no perſon can be ſuppoſed to approach near enough to apply them in a proper manner. Every fire has its beginning, for the moſt part, in ſome apartment; and as ſoon as diſcovered, the family, inſtead of loſing all preſence of mind, ſhould immediately apply one or more of theſe machines, which will then fully anſwer the intention. The proper time of applying them, ſuppoſes that they are ready at hand. It will be in vain to think of fetching them from any conſiderable diſtance, as it will then be too late for them to perform any important ſervice; except indeed being the probable means of ſaving ſome adjacent houſe, by extinguiſhing the flames as often as they break out, till the building firſt on fire is totally conſumed, and, by falling into ruins, leaves the other in perfect ſafety."

On the 19th of May 1761, at noon, Mr Godfrey's experiment for extinguiſhing fire, was tried in an houſe erected for that purpoſe, near Mary-le-bone. Their royal highneſſes the duke of York, prince William Henry, prince Henry Frederick, a great number of perſons of rank and diſtinction, and many of the learned world, gave their attendance on this ſingular occaſion. The houſe, which is of brick, conſiſts of three rooms, one above another, a ſtair-caſe, chimney, lath-and-plaſter cielings, and a kind of wainſcotting round the rooms, of rough deal. Exactly at 12 o'clock the ground-room, and that up one pair of ſtairs, were ſet on fire, by lighting the faggots and ſhavings laid in there for that purpoſe: in about 15 minutes the wainſcot of the under room was thought to be ſufficiently in flames, and three of the machines were thrown in; which, by almoſt immediate and ſudden exploſions, inſtantaneouſly extinguiſhed the flames, and the very ſmoke in that apartment in a few minutes totally diſappeared. By this time, the firemen, &c. who had the care of throwing in the machines, gave an alarm that the ſtair-caſe had taken fire, and that it was neceſſary directly to go to work upon the next room; which was accordingly done, and with the ſame effect. The experiment, however, hitherto did not univerſally ſatiſfy: in the laſt inſtance eſpecially it was thought to be too haſtily put in execution; and the populace, without-ſide the paling, who were ſuppoſed to amount to near 20,000, and whoſe curioſity, from the very nature of their ſituation, remained much diſſatisfied, began to grow rather riotous, and talked of a ſecond bottle-conjuror. For the ſake of the experiment, therefore, and to remove all manner of doubt, Mr Godfrey conſented to a third experiment in the upper room, which was entirely of wood. The flames were now ſuffered to get to a conſiderable height, and even the window-frames deſtroyed, before the machines were thrown in: which, however, anſwered exactly as the former had done; and, being quite in ſight of the out-ſtanders, met with univerſal approbation.

In the year 1734, the ſtates of Sweden offered a premium of 20,000 crowns for the beſt method of ſtopping the progreſs of accidental fires; when one Mr Fuches, a German phyſician, made a preparation for that end, and the experiment was made on a houſe built on purpoſe, of dry fir, at Legard iſland. In the buildings were placed ſeveral tubs of tar and pitch, and a great quantity of chips, all which were ſet on fire; flames iſſuing through the top of the houſe, windows, &c. when he threw in one of the barrels containing the preparation, which immediately quenched the flames; a ſecond barrel entirely cleared the ſmoke away; and the whole was executed to the ſatisfaction of the ſpectators, and to the no ſmall ſatisfaction of the inventor, who was about to return home, when unexpectedly the flames broke out again, ſuppoſed to be occaſioned by a ſmall quantity of combuſtible matter being introduced and ſet on fire ſecretly by ſome malicious perſon. Upon this the wrong-headed mob fell upon Mr Fuches, and beat him moſt unmercifully, ſo that he narrowly eſcaped with his life. He ſoon after left the country, and never could be prevailed on (tho' ſtrongly perſuaded by ſome of the moſt eminent citizens) to return. It is ſaid, another experiment of the ſame kind was tried in the year 1761 in Holland; but rendered abortive through the perverſeneſs of the populace.

Theſe machines of Mr Godfrey's, it is evident, would be of great uſe in extinguiſhing fires on ſhipboard; and might be conſidered as a no leſs neceſſary part of a ſhip's lading, than her ſtores or ammunition.

The hint of theſe machines is ſaid to have been taken by Dr Godfrey from the invention of one Zachary Greyl, who exhibited machines ſimilar to thoſe of Dr Godfrey, before perſons of the firſt rank, but without meeting with any encouragement. His machines were made of wood, and the liquor employed was only water, and conſequently inferior to Dr Godfrey's in its power of extinguiſhing fire. The latter is ſaid to have mixed his water with a certain quantity of oil of vitriol, or with ſal ammoniac. Theſe machines, however, are found to be only ſerviceable in the beginning of a fire. When the roof had fallen in, they had no effect.

Water-Engine for Extinguiſhing FIRE. See HYDROSTATICS, n° 33.

In uſing this machine we have the following improvement by Dr Hoffman, which promiſes to be of great efficacy. As ſoon as the engine is in readineſs to work, ſtir into the water that immediately is to be diſcharged, ſeven or eight pounds of pearl-aſhes in powder, and continue to add it in this manner as occaſion requires; taking care that it be directed againſt the timber or wainſcot, &c. juſt beginning to burn, and not waſted againſt the brickwork: or, where time will admit, diſſolve any quantity of pearl-aſhes in a copper with water, and as faſt as it diſſolves, which will be in a few minutes, mix a pailful with the water in the engine, pretty often; and whatever burning wood it is played upon, will be extinguiſhed as if it was dipped in water, and will not burn afreſh in the part extinguiſhed.

Uſe of Gun-powder for Extinguiſhing FIRES. It is well known, that the inner parts of chimneys eaſily take fire; the ſoot that kindles therein emits a greater flame, according as the tunnel is more elevated, becauſe the inferior air feeds the fire. If this air could therefore be ſuppreſſed, the fire would ſoon be extinguiſhed. In order to this, ſome diſcharge a piſtol into the chimney, which produces no effect: others lay under the chimney a copper full of water; but the vapours that riſe from it, far from extinguiſhing the fire, ſeem to give it new force. Water thrown into the chimney at top is equally of no effect, becauſe it comes down through the middle of the tunnel, and not along the ſides. It would be more adviſeable to ſtop with dung the upper orifices of the tunnel for quenching

ing the fire. But the ſureſt and readieſt method is, to take a little gunpowder, and, having humected it with ſpittle for binding it, to form it into ſmall maſſes, and ſo throw it into the hearth of the chimney. When it is burnt, and has produced a conſiderable vapour, a ſecond, afterwards a third, are thrown, and ſo on, as much as is neceſſary. In a little time the fire is extinguiſhed, and, as it were, choaked by this vapour; and cakes of inflamed ſoot are ſeen to fall from the tunnel, till at laſt not the leaſt veſtige of fire appears.

Fire, in theology. See Hell.

We read of the ſacred fire in the firſt temple of Jeruſalem, concerning which the Jews have a tradition that it came down from heaven: it was kept with the utmoſt care, and they were forbidden to carry any ſtrange fire into the temple. This fire is one of the five things which the Jews confeſs were wanting in the ſecond temple.

The pagans had their ſacred fires, which they kept in their temples with the moſt religious care, and which were never to be extinguiſhed. Numa was the firſt who built a temple to Fire as a goddeſs, at Rome, and inſtituted an order of prieſteſſes for the preſervation of it. See Vestals.

Fire was the ſupreme god of the Chaldeans; the Magi were worſhippers of fire; and the Greeks and Armenians ſtill keep up a ceremony called the *holy fire*, upon a perſuaſion that every Eaſter-day a miraculous fire deſcends from heaven into the holy ſepulchre, and kindles all the lamps and candles there.

Fire *kindled ſpontaneouſly in the Human Body*. See *Extraordinary Caſes of* Burning.

Fire-*Barrel*. See Fire-*Ship*, Note (b.)

Fire-*Bavins*. Ibid. Note (d.)

Fire-*Arrow*, in naval artillery, is a ſmall iron dart furniſhed with ſprings and bars, together with a match impregnated with ſulphur and powder, which is wound about its ſhaft. It is intended to fire the ſails of the enemy, and is for this purpoſe diſcharged from a muſquetoon or ſwivel-gun. The match being kindled by the exploſion, communicates the flame to the ſail againſt which it is directed, where the arrow is faſtened by means of its bars and ſprings. This weapon is peculiar to hot climates, particularly the Weſt Indies, where the ſails being extremely dry by reaſon of the great heats, they inſtantly take fire, and of courſe ſet fire to the maſts and rigging, and laſtly to the veſſel itſelf.

Fire-*Ball*, a compoſition of meal-powder, ſulphur, ſalt-petre, pitch, &c. about the bigneſs of a hand-grenade, coated over with flax, and primed with the ſlow compoſition of a fuze. This is to be thrown into the enemy's works in the night-time, to diſcover where they are; or to fire houſes, galleries, or blinds of the beſiegers; but they are then armed with ſpikes or hooks of iron, that they may not roll off, but ſtick or hang where they are deſired to have any effect.

Fire-*Cocks*. Churchwardens in London and within the bills of mortality, are to fix firecocks at proper diſtances in ſtreets, and keep a large engine and hand-engine for extinguiſhing fire, under the penalty of 10l. ſtat. 6 Ann. *c.* 31.

On the breaking out of any fire in London or Weſtminſter, the conſtables and beadles of pariſhes ſhall repair to the place with their ſtaves, and aſſiſt in extinguiſhing it, and cauſe the people to work for that end, &c.

Fire-*Engine*. See Steam-*Engine*.

Fire-*Flaire*, in ichthyology. See Raja.

Fire-*Flies*, a ſpecies of flies common in Guiana, of which there are two ſpecies. The largeſt is more than an inch in length, having a very large head connected with the body by a joint of a particular ſtructure, with which at ſome times it makes a loud knock, particularly when laid on its back. The fly has two feelers or horns, two wings, and ſix legs. Under its belly is a circular patch, which, in the dark, ſhines like a candle; and on each ſide of the head near the eyes, is a prominent, globular, luminous body, in ſize about one third larger than a muſtard-ſeed. Each of theſe bodies is like a living ſtar, emitting a bright, and not ſmall, light; ſince two or three of theſe animals, put into a glaſs-veſſel, afford light ſufficient to read without difficulty, if placed cloſe to the book. When the fly is dead, theſe bodies will ſtill afford conſiderable light, though it is leſs vivid than before; and if bruiſed, and rubbed over the hands or face, they become luminous in the dark, like a board ſmeared over with Engliſh phoſphorus. They have a reddiſh-brown or cheſnut colour; and live in rotten trees in the day, but are always abroad in the night. The other kind is not more than half as large as the former: their light proceeds from under their wings, and is ſeen only when they are elevated, like ſparks of fire appearing or diſappearing at every ſecond. Of theſe the air is full in the night, tho' they are never ſeen in the day. They are common not only in the ſouthern, but in the northern parts of America, during the ſummer.

Fire-*Lock*, or *Fuſil*, a ſmall gun which fires with a flint. It is diſtinguiſhed from an old muſquet, or match-lock, which was fired with a match. The firelock is now in common uſe in the European armies.

Fire-*Pots*, in the military art, ſmall earthen pots, into which is put a charged grenade, and over that powder enough till the grenade is covered; then the pot is covered with a piece of parchment, and two pieces of match acroſs lighted: this pot being thrown by a handle of matches where it is deſigned, it breaks and fires the powder, and burns all that is near it, and likewiſe fires the powder in the grenade, which ought to have no fuſe, to the end its operations may be the quicker.

Fire-*Reeds*. See the next article, Note (c.)

Fire-*Ship*, an old veſſel filled with combuſtible materials, and fitted with grappling irons to hook, and ſet fire to, the enemies ſhips in battle, &c.

As there is nothing particular in the conſtruction of this ſhip, except the apparatus by which the fire is inſtantly conveyed from one part to another, and from thence to the enemy, it will be ſufficient to deſcribe the fire-room, where theſe combuſtibles are encloſed, together with the inſtruments neceſſary to grapple the ſhip intended to be deſtroyed.

The fire-room is built between decks, and limited on the after-part by a *bulk-head*, L, behind the main-maſt, from which it extends quite forward, as repreſented in fig. 1. Plate CXIV. The train incloſed in this apartment is contained in a variety of wooden troughs, D, G, which interſect each other in different parts of the ſhip's length; being ſupported at proper diſtances by croſs-pieces and ſtanchions. On each ſide of the ſhip are ſix or ſeven ports, H, about 18 inches broad, and 15 inches high; and having their lids to open downward, contrary to the uſual method.

Againſt every port is placed an iron chamber (A), which, at the time of firing the ſhip, blows out the port-lid, and opens a paſſage for the flame. Immediately under the main and fore-ſhrouds is fixed a wooden funnel M; whoſe lower end communicates with a fire-barrel (B), by which the flame paſſing through the funnel is conducted to the ſhrouds. Between the funnels, which are likewiſe called *fire-trunks*, are two ſcuttles, or ſmall holes in the upper deck, ſerving alſo to let out the flames. Both funnels muſt be ſtopped with plugs, and have ſail-cloth or canvas nailed cloſe over them, to prevent any accident happening from above to the combuſtibles laid below.

Falconer's Marine Dictionary.

The ports, funnels, and ſcuttles, not only communicate the flames to the outſide and upper-works of the ſhip and her rigging; but likewiſe open a paſſage for the inward air, confined in the fire-room, which is thereby expanded ſo as to force impetuouſly thro' thoſe out-lets, and prevent the blowing up of the decks, which muſt of neceſſity happen from ſuch a ſudden and violent rarefaction of the air as will then be produced.

On each ſide of the bulk-head behind is cut a hole L, of ſufficient ſize to admit a trough of the ſame dimenſions as the others. A leading trough, L I, whoſe foremoſt-end communicates with another trough within the fire-room, is laid cloſe to this opening, from whence it extends obliquely to a ſally-port I, cut thro' the ſhip's ſide. The decks and troughs are well covered with melted roſin. At the time of the firing either of the leading troughs, the flame is immediately conveyed to the oppoſite ſide of the ſhip, whereby both ſides burn together.

The ſpaces N, O, behind the fire-room, repreſent the cabins of the lieutenant and maſter, one of which is on the ſtarboard, and the other on the larboard ſide. The captain's cabin, which is ſeparated from theſe by a bulk-head, is exhibited alſo by P.

Four of the eight fire-barrels are placed under the four fire-trunks; and the other four between them, two on each ſide the fire-ſkuttles, where they are ſecurely cleated to the deck. The longeſt reeds (C) are put into the fore and aft troughs, and tied down: the ſhorteſt reeds are laid in the troughs athwart, and tied down alſo. The bavins (D), dipped at one end, are tied faſt to the troughs over the reeds, and the curtains are nailed up to the beams, in equal quantities, on each ſide of the fire-room.

The remainder of the reeds are placed in a poſition nearly upright, at all the angles of every ſquare in the fire-room, and there tied down. If any reeds are left, they are to be put round the fire-barrels, and other vacant places, and there tied faſt.

Inſtructions to prime.

TAKE up all your reeds, one after another, and ſtrow a little compoſition at the bottom of all the troughs under the reeds, and then tie them gently down again: next ſtrow compoſition upon the upper part of the reeds throughout the fire-room; and upon the ſaid compoſition lay double quick-match upon all the reeds, in all the troughs: the remainder of the compoſition ſtrow over all the fire-room, and then lay your bavins looſe.

Caſt off all the covers of the fire-barrels, and hang the quick-match looſe over their ſides, and place leaders

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(A) The iron-chambers are ten inches long, and 3.5 in diameter, They are breeched againſt a piece of wood fixed acroſs the ports, and let into another a little higher. When loaded, they are almoſt filled with corn-powder, and have a wooden tompion well driven into their muzzles. They are primed with a ſmall piece of quick-match thruſt through their vents into the powder, with a part of it hanging out. When the ports are blown open by means of the iron-chambers, the port-lids either fall downward, or are carried away by the exploſion.

(B) The fire-barrels ought to be of a cylindrical form, as moſt ſuitable to contain the reeds with which they are filled, and more convenient for ſtowing them between the troughs in the fire-room. Their inſide chambers ſhould not be leſs than 21 inches, and 30 inches is ſufficient for their length. The bottom parts are firſt well ſtored with ſhort double-dipped reeds placed upright; and the remaining vacancy is filled with fire-barrel compoſition, well mixed and melted, and then poured over them. The compoſition uſed for this purpoſe is a maſs of ſulphur, pitch, tar, and tallow.

There are five holes, of three-fourths inch in diameter, and three inches deep, formed in the top of the compoſition while it is yet warm; one being in the centre, and the other four at equal diſtances round the ſides of the barrel. When the compoſition is cold and hard, the barrel is primed by filling thoſe holes with fuſe-compoſition, which is firmly driven into them, ſo as to leave a little vacancy at the top to admit a ſtrand of quick-match twice doubled. The centre-hole contains two ſtrands at their whole length, and every ſtrand muſt be driven home with mealed powder. The looſe ends of the quick-match being then laid within the barrel, the whole is covered with a dipped curtain, faſtened on with a hoop that ſlips over the head of the barrel, to which it is nailed.

The barrels ſhould be made very ſtrong, not only to ſupport the weight of the compoſition before firing, when they are moved or carried from place to place, but to keep them together whilſt burning: for if the ſtaves are too light and thin, ſo as to burn very ſoon, the remaining compoſition will tumble out and be diſſipated, and the intention of the barrels, to carry the flame aloft, will accordingly be fruſtrated.

The curtain is a piece of coarſe canvas, nearly a yard in breadth and length, thickened with melted compoſition, and covered with ſaw-duſt on both ſides.

(C) The reeds are made up in ſmall bundles of about a foot in circumference, cut even at both ends, and tied together in two places. They are diſtinguiſhed into two kinds, viz. the long and ſhort; the former of which are four feet, and the latter two feet five inches in length. One part of them are ſingly dipped, i. e. at one end: the reſt are dipped at both ends in a kettle of melted compoſition. After being immerſed about ſeven or eight inches in this preparation, and then drained, they are ſprinkled over with pulveriſed ſulphur upon a tanned hide.

(D) The bavins are made of birch, heath, or other bruſh-wood, which is tough and readily kindled. They are uſually two or three feet in length, and have all their buſh-ends lying one way, the other ends being tied together with ſmall cords. They are dipped in compoſition at the buſh-ends, whoſe branches are afterwards confined by the hand, to prevent them from breaking off by moving about; and alſo to make them burn more fiercely. After being dipped in the ſame manner as the reeds, they alſo are ſprinkled with ſulphur.

ers of quick-match from the reeds into the barrels, and from thence into the vent of the chambers, in ſuch a manner as to be certain of their blowing open the ports, and ſetting fire to the barrels. Two troughs of communication from each door of the fire-room to the ſally-ports, muſt be laid with a ſtrong leader of quick-match, four or five times double: alſo a croſs-piece to go from the ſally-port, when the ſhip is fired, to the communication trough, laid with leaders of quick-match, that the fire may be communicated in both ſides at once.

What quick-match is left place ſo that the fire may be communicated to all parts of the room at once, eſpecially about the ports and fire-barrels, and ſee that the chambers are well and freſh primed. [N. B. The port-fire uſed for firing the ſhip, burns about 12 minutes. Great care muſt be taken to have no powder on board when the ſhip is fired.]

The ſheer-hooks (repreſented by fig. 2.) are fitted ſo as to faſten on the yard-arms of the fire-ſhip, where they hook the enemy's rigging. The fire-grapplings, (fig. 3.) are either fixed on the yard-arms, or thrown by hand, having a chain to confine the ſhips together, or faſten thoſe inſtruments wherever neceſſary.

When the commanding officer of a fleet diſplays the ſignal to prepare for action, the fire-ſhips fix their ſheer-hooks, and diſpoſe their grapplings in readineſs. The battle being begun, they proceed immediately to prime, and prepare their fire-works. When they are ready for grappling, they inform the admiral thereof by a particular ſignal.

To avoid being diſabled by the enemy's cannon during a general engagement, the fire-ſhips continue ſufficiently diſtant from their line of battle, either to windward or to leeward.

They cautiouſly ſhun the openings or intervals of the line, where they would be directly expoſed to the enemy's fire, from which they are covered by lying on the oppoſite ſide of their own ſhips. They are attentively to obſerve the ſignals of the admiral, or his ſeconds, in order to put their deſigns immediately in execution.

Although no ſhip of the line ſhould be previouſly appointed to protect any fire-ſhip, except a few of the ſmalleſt particularly deſtined to this ſervice, yet the ſhip before whom ſhe paſſes in order to approach the enemy, ſhould eſcort her thither, and aſſiſt her with an armed boat, or whatever ſuccour may be neceſſary in her ſituation.

The captain of the fire-ſhip ſhould himſelf be particularly attentive that the above inſtructions are punctually executed, and that the yards may be ſo braced when he falls along-ſide of the ſhip intended to be deſtroyed, that the ſheer-hooks and grapplings faſtened to the yard-arms, &c. may effectually hook the enemy. He is expected to be the laſt perſon who quits the veſſel; and being furniſhed with every neceſſary aſſiſtance and ſupport, his reputation will greatly depend on the ſucceſs of his enterpriſe.

FIRE *from Cold Liquors*. See CHEMISTRY, n° 219.

Lambent FIRES, as the ſhining of meat at certain ſeaſons, the luminouſneſs of the ſea, of inſects, vapours, &c. See the articles LIGHT, PHOLAS, MEDUSA, NEREIS, FIRE-*Flies*, GLOW-*Worm*, &c.

Port-FIRE. See PORT-*Fire*.

Spur-FIRE. See SPUR-*Fire*.

FIRING-IRON, in farriery, an inſtrument not unlike the blade of a knife; which being made red-hot, is applied to a horſe's hams, or other places ſtanding in need of it, as in preternatural ſwellings, farcy, knots, &c. in order to diſcuſs them.

FIRKIN, an Engliſh meaſure of capacity for things liquid, being the fourth part of the barrel: it contains eight gallons of ale, ſoap, or herrings; and nine gallons of beer. See MEASURE and BARREL.

FIRLOT, a dry meaſure uſed in Scotland. The oat-firlot contains 21¼ pints of that country; the wheat-firlot contains about 2211 cubical inches; and the barley-firlot, 31 ſtandard-pints. Hence it appears that the Scotch wheat-firlot exceeds the Engliſh buſhel by 33 cubical inches.

FIRMAMENT, in the Ptolemaic aſtronomy, the eighth heaven or ſphere, with reſpect to the ſeven ſpheres of the planets which it ſurrounds. It is ſuppoſed to have two motions: a diurnal motion, given to it by the primum mobile, from eaſt to weſt, about the poles of the ecliptic; and another oppoſite motion from weſt to eaſt: which laſt it finiſhes, according to Tycho, in 25412 years, according to Ptolemy in 36000, and according to Copernicus in 25800, in which time the fixed ſtars return to the ſame points in which they were at the beginning. This period is commonly called the *Platonic year*, or the *great year*.

FIRMAMENT is alſo uſed, in divers places of ſcripture, to denote the middle region of the air.

FIRMAN is a paſſport or permit granted by the great mogul to foreign veſſels, to trade within the territories of his juriſdiction.

FIRMICUS MATERNUS (Julius), a famous writer, who compoſed in Latin, about the year 345, an excellent book in defence of Chriſtianity, entitled *De errore profanarum religionum*, which is printed with the notes of John Wouver. There are alſo attributed to him eight books of aſtronomy, printed by Aldus Manutius in 1501; but this laſt work appears to have been written by another Julius Firmicus, who lived at the ſame time.

FIRMNESS, denotes the conſiſtence of a body, or that ſtate wherein its ſenſible parts cohere in ſuch a manner that the motion of one part induces a motion in the reſt.

FIRMIN (Thomas), an eminent citizen of London, born in 1632, who diſtinguiſhed himſelf by his public benefactions and extenſive charities, as alſo by ſome opinions contrary to the received doctrine of the Trinity. The plague in 1665, the great conflagration in 1666, with the arrival of the French proteſtants in 1680 and 1681, all furniſhed him with great opportunities of exerting his benevolent diſpoſition. He died in 1697; and was buried in the cloiſters of Chriſt's hoſpital, where his virtues are recorded in a monumental inſcription.

FIRST-FRUITS, (*primitiæ*,) among the Hebrews, were oblations of part of the fruits of the harveſt, offered to God as an acknowledgement of his ſovereign dominion. The firſt of theſe fruits was offered in the name of the whole nation, being either two loaves of bread, or a ſheaf of barley which was threſhed in the court of the temple. Every private perſon was obliged to bring his firſt-fruits to the temple; and theſe conſiſted of wheat, barley, grapes, figs, apricots, olives, and dates.

There was another ſort of firſt-fruits which were paid to God. When bread was kneaded in a family, a portion of it was ſet apart, and given to the prieſt or Levite who dwelt in the place: if there was no prieſt or Levite there, it was caſt into the oven, and conſumed by the fire. Theſe offerings made a conſiderable part of the revenues of the Hebrew prieſthood.

Firſt-fruits are frequently mentioned in ancient Chriſtian writers as one part of the church-revenue. One of the councils of Carthage enjoins, that they ſhould conſiſt only of grapes and corn; which ſhews, that this was the practice of the African church.

First-*Fruits*, in the church of England, are the profits of every ſpiritual benefice for the firſt year, according to the valuation thereof in the king's books.

FISC, fiscus, in the civil law, the treaſury of a prince, or ſtate; or that to which all things due to the public do fall. The word is derived from the Greek φισκος, a great baſket, uſed when they went to market.—By the civil law, none but a ſovereign prince has a right to have a fiſc or public treaſury.

At Rome, under the emperors, the term *ærarium* was uſed for the revenues deſtined for ſupport of the charges of the empire; and *fiſcus* for thoſe of the emperor's own family. The treaſury, in effect, belonged to the people, and the fiſcus to the prince.

FISCAL, in the civil law, ſomething relating to the pecuniary intereſt of the prince or people. The officers appointed for the management of the fiſc, were called *procuratores fiſci*, and *advocati fiſci*; and among the caſes enumerated in the conſtitutions of the empire where it was their buſineſs to plead, one is againſt thoſe who have been condemned to pay a fine to the fiſc on account of their litigiouſneſs, or frivolous appeals.

FISH, in natural hiſtory, an animal that lives in the waters as the natural place of its abode.

The moſt general diviſion of fiſhes is into *freſh* and *ſalt* water ones. Some, however, are of opinion, that all fiſhes naturally inhabit the ſalt-waters, and that they have mounted up into rivers only by accident. A few ſpecies only ſwim up into the rivers to depoſit their ſpawn; but by far the greateſt number keep in the ſea, and would ſoon expire in freſh water. There are about 400 ſpecies of fiſhes (according to Linnæus) of which we know ſomething; but the unknown ones are ſuppoſed to be many more; and as they are thought to lie in great depths of the ſea remote from land, it is probable that many ſpecies will remain for ever unknown.

1 Shape of fiſhes admirably fitted for ſwift motion.

Naturaliſts obſerve an exceeding great degree of wiſdom in the ſtructure of fiſhes, and in their conformation to the element in which they are to live. Moſt of them have the ſame external form, ſharp at either end, and ſwelling in the middle, by which they are enabled to traverſe the fluid in which they reſide with greater velocity and eaſe. This ſhape is in ſome meaſure imitated by men in thoſe veſſels which they deſign to ſail with the greateſt ſwiftneſs; but the progreſs of the ſwifteſt ſailing ſhip is far inferior to that of fiſhes. Any of the large fiſhes overtake a ſhip in full ſail with the greateſt eaſe, play round it as though it did not move at all, and can get before it at pleaſure.

2 Uſes of the fins and tails of fiſhes.

The chief inſtruments of a fiſh's motion have been ſuppoſed to be the fins; which in ſome are much more numerous than in others. A fiſh completely fitted for ſwimming with rapidity, is generally furniſhed with two pair of fins on the ſides, and three ſingle ones, two above, and one below. But it does not always happen that the fiſh which has the greateſt number of fins, is the ſwifteſt ſwimmer. The ſhark is thought to be one of the ſwifteſt fiſhes, and yet it has no fins on its belly; the haddock ſeems to be more completely fitted for motion, and yet does not move ſo ſwiftly. It is even obſervable, that ſome fiſhes which have no fins at all, ſuch as lobſters, dart forward with prodigious rapidity, by means of their tail; and the inſtrument of progreſſive motion, in all fiſhes, is now found to be the tail. The great uſe of the fins is to keep the body *in equilibrio*: and if the fins are cut off, the fiſh can ſtill ſwim; but will turn upon its ſides or its back, without being able to keep itſelf in an erect poſture as before. If the fiſh deſires to turn, a blow from the tail ſends it about in an inſtant; but if the tail ſtrikes both ways, then the motion is progreſſive.

All fiſhes are furniſhed with a ſlimy, glutinous matter, which defends their bodies from the immediate contact of the ſurrounding fluid, and which likewiſe, in all probability, aſſiſts their motion through the water. Beneath this, in many kinds, is found a ſtrong covering of ſcales, which, like a coat of mail, defends it ſtill more powerfully; and, under that, before we come to the muſcular parts of the body, lies an oily ſubſtance, which alſo tends to preſerve the requiſite warmth and vigour.

3 Arguments for the inferiority of fiſhes to land animals.

By many naturaliſts fiſhes are conſidered as of a nature very much inferior to land-animals, whether beaſts or birds. Their ſenſe of feeling, it is thought, muſt be very obſcure on account of the ſcaly coat of mail in which they are wrapped up. The ſenſe of ſmelling alſo, it is ſaid, they can have only in a very ſmall degree. All fiſhes, indeed, have one or more noſtrils; and even thoſe that have not the holes perceptible without, yet have the bones within, properly formed for ſmelling. But as the air is the only medium we know proper for the diſtribution of odours, it cannot be ſuppoſed that theſe animals which reſide conſtantly in the water can be affected by them. As to taſting, they ſeem to make very little diſtinction. The palate of moſt fiſhes is hard and boney, and conſequently incapable of the powers of reliſhing different ſubſtances; and accordingly theſe voracious animals have often been obſerved to ſwallow the fiſherman's plummet inſtead of the bait. Hearing is generally thought to be totally deficient in fiſhes, notwithſtanding the diſcoveries of ſome anatomiſts who pretend to have found out the bones deſigned for the organ of hearing in their heads. They have no voice, it is ſaid, to communicate with each other, and conſequently have no need of an organ for hearing. Sight ſeems to be that ſenſe of which they are poſſeſſed in the greateſt degree; and yet even this ſeems obſcure, if we compare it with that of other animals. The eye, in almoſt all fiſhes, is covered with the ſame tranſparent ſkin which covers the reſt of the head, and which probably ſerves to defend it in the water, as they are without eyelids. The globe is more depreſſed anteriorly, and is furniſhed behind with a muſcle which ſerves to lengthen or flatten it as there is occaſion. The cryſtalline humour, which in quadrupeds is flat, and of the ſhape of a button-mould, or like a very convex lens, in fiſhes is quite round, or ſometimes oblong like an egg. Hence it is thought that fiſhes are extremely near-ſighted; and that, even in the water, they can perceive objects only at a very ſmall diſtance. Hence, ſay they, it is evident how far fiſhes are below terreſtrial animals in their ſenſations, and conſequently in their enjoyments. Even their brain, which is by ſome ſuppoſed to be of a ſize with every creature's underſtanding, ſhews that fiſhes are very much inferior to birds in this reſpect.

4 Objections to theſe arguments. Others argue differently with regard to the nature of fiſhes.—With reſpect to the ſenſe of feeling, ſay they, it cannot be juſtly argued that fiſhes are deficient, merely becauſe they are covered with ſcales, as it is poſſible theſe ſcales may be endued with as great a power of ſenſation as we can imagine. The ſenſe of feeling is not properly connected with *ſoftneſs* in any organ, more than with *hardneſs* in it. A ſimilar argument may be uſed with regard to ſmelling; for though we do not know how ſmells can be propagated in water, that is by no means a proof that they are not ſo. On the contrary, as water is found to be capable of abſorbing putrid effluvia from the air*, nothing is more probable than that theſe putrid effluvia, when mixed with the water, would affect the olfactory organs of fiſhes, as well as they affect ours when mixed with the air.—With regard to taſte, it certainly appears, that fiſhes are able to diſtinguiſh their proper food from what is improper, as well as other animals. Indeed, no voracious animal ſeems to be endued with much ſenſibility in this reſpect; nor would it probably be conſiſtent with that way of promiſcuouſly devouring every creature that comes within its reach, without which theſe kinds of animals could not ſubſiſt.

With reſpect to the hearing of fiſhes, it is urged, that, when, they, kept in a pond may be made to anſwer at the call of a whiſtle or the ringing of a bell; and they will even be terrified at any ſudden and violent noiſe, ſuch as thunder, the firing of guns, &c. and ſhrink to the bottom of the water. Among the ancients, many were of opinion that fiſhes had the ſenſe of hearing, though they were by no means ſatisfied about the ways or paſſages by which they heard. Placentini afterwards diſcovered ſome bones in the head of the pike, which had very much the appearance of being organs of hearing, though he could never diſcover any external paſſages to them. Klein affirmed, from his own experiments and obſervations, that all fiſhes have the organs of hearing; and have alſo paſſages from without to theſe organs, though in many ſpecies they are difficult to be ſeen; and that even the moſt minute and obſcure of theſe are capable of communicating a tremulous motion to thoſe organs, from ſounds iſſuing from without. This is likewiſe aſſerted by M. Geoffroy†, who gives a particular deſcription of the organs of hearing belonging to ſeveral ſpecies. Theſe organs are a ſet of little bones extremely hard, and white, like fine porcelain, which are to be found in the heads of all fiſhes: The external auditory paſſages are very ſmall; being ſcarce ſufficient to admit a hog's briſtle; though with care they may be diſtinguiſhed in almoſt all fiſhes. It can by no means be thought that the water is an improper medium of ſound, ſeeing daily experience ſhews us that ſounds may be conveyed not only through water, but through the moſt ſolid bodies†. It ſeems indeed very difficult to determine the matter by experiment. Mr Gouan, who kept ſome gold-fiſhes in a vaſe, informs us, that whatever noiſe he made, he could neither terrify nor diſturb them; he halloo'd as loud as he could, putting a piece of paper between his mouth and the water, to prevent the vibrations from affecting the ſurface, and the fiſhes ſtill ſeemed inſenſible: but when the paper was removed, and the ſound had its full effect on the water, the caſe was then altered, and the fiſhes inſtantly ſunk to the bottom. This experiment, however, or others ſimilar to it, cannot prove that the fiſhes did not hear the ſounds before the paper was removed; it only ſhews that they were not alarmed till a ſenſible vibration was introduced into the water. The call of a whiſtle may alſo be ſuppoſed to affect the water in a fiſh-pond with a vibratory motion: but this certainly muſt be very obſcure; and if fiſhes can be aſſembled in this manner when no perſon is in ſight, it amounts to a demonſtration that they actually do hear.

The arguments uſed againſt the ſight of fiſhes are the weakeſt of all. Many inſtances which daily occur, ſhew that fiſhes have a very acute ſight, not only of objects in the water, but of thoſe in the air. Their jumping out of the water in order to catch flies is an abundant proof of this; and this they will continue to do in a fine ſummer-evening, even after it is ſo dark that we cannot diſtinguiſh the inſects they attempt to catch.

5 Fiſhes cannot live without air. Though fiſhes are formed for living entirely in the water, yet they cannot ſubſiſt without air. On this ſubject Mr Hawkſbee made ſeveral experiments, which are recorded in the Philoſophical Tranſactions. The fiſhes he employed were gudgeons; a ſpecies that are very lively in the water, and can live a conſiderable time out of it. Three of them were put into a glaſs veſſel with about three pints of freſh water, which was deſigned as a ſtandard to compare the others by. Into another glaſs, to a like quantity of water, were put three more gudgeons, and thus the water filled the glaſs to the very brim. Upon this he ſcrewed down a braſs-plate with a leather below, to prevent any communication between the water and the external air; and, that it might the better reſemble a pond frozen over, he ſuffered as little air as poſſible to remain on the ſurface of the water. A third glaſs had the ſame quantity of water put into it; which, firſt by boiling, and then by continuing it a whole night *in vacuo*, was purged of its air as well as poſſible; and into this alſo were put three gudgeons. In about half an hour, the fiſhes in the water from whence the air had been exhauſted, began to diſcover ſome ſigns of uneaſineſs by a more than ordinary motion in their mouths and gills. Thoſe who had no communication with the external air, would at this time alſo frequently aſcend to the top, and ſuddenly ſwim down again: and in this ſtate they continued for a conſiderable time, without any ſenſible alteration. About five hours after this obſervation, the fiſhes in the exhauſted water were not ſo active as before, upon ſhaking the glaſs which contained them. In three hours more, the included fiſhes

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* See *Air*, nº 29.

Diſſerta- *n ſur l'* *gane de* *uie*, p. 97, ſeq.

† See *Acouſtics*.

lay all at the bottom of the glaſs with their bellies upwards; nor could they be made to ſhake their fins or tail by any motion given to the glaſs. They had a motion with their mouths, however, which ſhewed that they were not perfectly dead. On uncovering the veſſel which contained them, they revived in two or three hours, and were perfectly well next morning; at which time thoſe in the exhauſted water were alſo recovered. The veſſel containing theſe laſt being put under the receiver of an air-pump, and the air exhauſted, they all inſtantly died. They continued at top while the air remained exhauſted, but ſunk to the bottom on the admiſſion of the atmoſphere.

6 Motion of the gills of fiſhes analogous to our breathing.

The uſe of air to fiſhes is very difficult to be explained; and indeed their method of obtaining the ſupply of which they ſtand conſtantly in need, is not eaſily accounted for. The motion of the gills in fiſhes is certainly analogous to our breathing, and ſeems to be the operation by which they ſeparate the air from the water. Their manner of breathing is as follows. The fiſh firſt takes a quantity of water by the mouth, which is driven to the gills; theſe cloſe, and keep the water which is ſwallowed from returning by the mouth; while the bony covering of the gills prevents it from going through them till the animal has drawn the proper quantity of air from it: then the bony covers open, and give it a free paſſage; by which means alſo the gills are again opened, and admit a freſh quantity of water. If the fiſh is prevented from the free play of its gills, it ſoon falls into convulſions, and dies. But though this is a pretty plauſible explanation of the reſpiration of fiſhes, it remains a difficulty not eaſily ſolved, what is done with this air. There ſeems to be no receptacle for containing it, except the air-bladder, or ſwim; which, by the generality of modern philoſophers, is deſtined not to anſwer any vital purpoſe, but only to enable the fiſh to riſe or ſink at pleaſure.

7 Of the uſe of the air-bladder in fiſhes.

The air-bladder is a bag filled with air, compoſed ſometimes of one, ſometimes of two, and ſometimes of three diviſions, ſituated towards the back of the fiſh, and opening into the maw or the gullet. The uſe of this in raiſing or depreſſing the fiſh, is proved by the following experiment. A carp being put into the air-pump, and the air exhauſted, the bladder is ſaid to burſt by the expanſion of the air contained in it; after which, the fiſh can no more riſe to the top, but ever afterwards crawls at the bottom. The ſame thing alſo happens when the air-bladder is pricked or wounded in ſuch a manner as to let the air out; in theſe caſes alſo the fiſh continues at the bottom, without a poſſibility of riſing to the top. From this it is inferred, that the uſe of the air-bladder is, by ſwelling at the will of the animal, to increaſe the ſurface of the fiſh's body, and thence diminiſhing its ſpecific gravity, to enable it to riſe to the top of the water, and to keep there at pleaſure. On the contrary, when the fiſh wants to deſcend, it is thought to contract the air-bladder; and being thus rendered ſpecifically heavier, it deſcends to the bottom.

The ancients were of opinion, that the air-bladder in fiſhes ſerved for ſome purpoſes eſſentially neceſſary to life; and Dr Prieſtley alſo conjectures, that the raiſing or depreſſing the fiſh is not the only uſe of theſe air-bladders, but that they alſo may ſerve ſome other purpoſes in the œconomy of fiſhes. There are many arguments indeed to be uſed on this ſide of the queſtion: the moſt concluſive of which is, that all the cartilaginous kind of fiſhes want air-bladders, and yet they riſe to the top, or ſink to the bottom, of the water, without any difficulty; and though moſt of the eel-kind have air-bladders, yet they cannot raiſe themſelves in the water without great difficulty.

8 Longevity of fiſhes.

9 Methods of determining their age.

Fiſhes are remarkable for their longevity. "Moſt of the diſorders incident to mankind (ſays Bacon) ariſe from the changes and alterations in the atmoſphere; but fiſhes reſide in an element little ſubject to change: theirs is an uniform exiſtence; their movements are without effort, and their life without labour. Their bones, alſo, which are united by cartilages, admit of indefinite extenſion; and the different ſizes of animals of the ſame kind among fiſhes, is very various. They ſtill keep growing: their bodies, inſtead of ſuffering the rigidity of age, which is the cauſe of the natural decay of land-animals, ſtill continue increaſing with freſh ſupplies; and as the body grows, the conduits of life furniſh their ſtores in greater abundance. How long a fiſh, that ſeems to have ſcarce any bounds put to its growth, continues to live, is not aſcertained; perhaps the life of a man would not be ſufficient to meaſure that of the ſmalleſt."—There have been two methods fallen upon for determining the age of fiſhes; the one is by the circles of the ſcales, the other by the tranſverſe ſection of the back bone. When a fiſh's ſcale is examined by a microſcope, it is found to conſiſt of a number of circles one within another, in ſome meaſure reſembling thoſe which appear on the tranſverſe ſection of a tree, and is ſuppoſed to give the ſame information. For, as in trees we can tell their age by the number of their circles; ſo, in fiſhes, we can tell theirs by the number of circles in every ſcale, reckoning one ring for every year of the animal's exiſtence.—The age of fiſhes that want ſcales may be known by the other method, namely, by ſeparating the joints of the back-bone, and then minutely obſerving the number of rings which the ſurface, where it was joined, exhibits.

10 Extreme voracity of fiſhes.

11 Their amazing increaſe.

Fiſhes are, in general, the moſt voracious animals in nature. In moſt of them, the maw is placed next the mouth; and, though poſſeſſed of no ſenſible heat, is endowed with a very ſurpriſing faculty of digeſtion. Its digeſtive power ſeems, in ſome meaſure, to increaſe in proportion to the quantity of food with which the fiſh is ſupplied. A ſingle pike has been known to devour 100 roaches in three days. Whatever is poſſeſſed of life, ſeems to be the moſt deſirable prey for fiſhes. Some, that have very ſmall mouths, feed upon worms, and the ſpawn of other fiſh: others, whoſe mouths are larger, ſeek larger prey; it matters not of what kind, whether of their own ſpecies, or any other. Thoſe with the largeſt mouths purſue almoſt every thing that hath life; and often meeting each other in fierce oppoſition, the fiſh with the largeſt ſwallow comes off with the victory, and devours its antagoniſt.—As a counterbalance to this great voracity, however, fiſhes are incredibly prolific. Some bring forth their young alive, others produce only eggs: the former are rather the leaſt fruitful; yet even theſe produce in great abundance. The viviparous blenny, for inſtance, brings forth 200 or 300 at a time. Thoſe which produce eggs, which they are obliged to leave to chance, either

ther on the bottom where the water is ſhallow, or floating on the ſurface where it is deeper, are all much more prolific, and ſeem to proportion their ſtock to the danger there is of conſumption.—Lewenhoeck aſſures us, that the cod ſpawns above nine millions in a ſeaſon. The flounder commonly produces above one million, and the mackarel above 500,000. Scarce one in 100 of theſe eggs, however, brings forth an animal: they are devoured by all the leſſer fry that frequent the ſhores, by water-fowl in ſhallow waters, and by the larger fiſhes in deep waters. Such a prodigious increaſe, if permitted to come to maturity, would overſtock nature; even the ocean itſelf would not be able to contain, much leſs provide for, one half of its inhabitants. But two wiſe purpoſes are anſwered by this amazing increaſe: it preſerves the ſpecies in the midſt of numberleſs enemies, and ſerves to furniſh the reſt with a ſuſtenance adapted to their nature.

12 Generation of fiſhes.

With reſpect to the generation of many kinds of fiſhes, the common opinion is, that the female depoſits her ſpan or eggs, and that the male afterwards ejects his ſperm or male ſemen upon it in the water. The want of the organs of generation in fiſhes, gives an apparent probability to this; but it is ſtrenuouſly oppoſed by Linnæus. He affirms, that there can be no poſſibility of impregnating the eggs of any animal out of its body. To confirm this, the general courſe of nature, not only in birds, quadrupeds, and inſects, but even in the vegetable world, has been called in to his aſſiſtance, as proving that all impregnation is performed while the egg is in the body of its parent: and he ſupplies the want of the organs of generation by a very ſtrange proceſs, affirming, that the males eject their ſemen always ſome days before the females depoſit their ova or ſpawn; and that the females ſwallow this, and thus have their eggs impregnated with it. He ſays, that he has freqently ſeen, at this time, three or four females gathered about a male, and greedily ſnatching up into their mouths the ſemen he ejects. He mentions ſome of the eſoces, ſome pearch, and ſome of the cyprini, in which he had ſeen this proceſs.

Many opinions have been ſtarted in order to account how it happens that fiſhes are found in pools, and ditches, on high mountains, and elſewhere. But Gmelin obſerves, that the duck-kind ſwallow the eggs of fiſhes; and that ſome of theſe eggs go down, and come out of their bodies unhurt, and ſo are propagated juſt in the ſame manner as has been obſerved of plants.

As to the *Diviſion of* FISHES, ſee ZOOLOGY, n° 10.

Breeding of FISHES may be turned to great advantage; for, beſides furniſhing the table, obliging one's friends, and raiſing money, the land will be thereby greatly improved, ſo as to yield more this way than by any other employment whatever. See FISH-*Pond*, *infra;* and BREEDING *of Fiſh*.

Feeding of FISHES. When they are fed in large pools or ponds, either malt boiled, or freſh grains, is the beſt food; thus carps may be raiſed and fed like capons, and tenches will feed as well. The care of feeding them is beſt committed to a gardener or the butler, who ſhould be always at hand. When fed in a ſtew, any ſort of grain boiled, eſpecially peas, and malt coarſely ground, are proper food; alſo the grains after brewing, while freſh and ſweet; but one buſhel of malt not brewed, will go as far as of grains.

FISH *and Fiſhing*, as regulated by law. No fiſherman ſhall uſe any net or engine for deſtroying the fry of fiſhes; and perſons uſing nets for that purpoſe, or taking ſalmon or trout out of ſeaſon, or any fiſh under certain lengths, are liable to forfeit 20s. and juſtices of peace, and lords of leets, have power to put the acts in force. See 1 *Eliz. c.* 17. 3 *Jac.* I. *c.* 12. 30 *Geo.* II. *c.* 21. *& poſt.* No perſon may faſten nets, &c. acroſs rivers to deſtroy fiſh, and diſturb the paſſage of veſſels, on pain of 5l. *ſtat.* 2. *Hen.* VI. *c.* 15. None ſhall fiſh in any pond or moat, &c. without the owner's licence, on pain of three months impriſonment; 31 *Hen.* VIII. *c.* 2. And no perſon ſhall take any fiſh in any river, without the conſent of the owner, under the penalty of 10s. for the uſe of the poor, and treble damage to the party aggrieved, leviable by diſtreſs of goods; and for want of diſtreſs, the offender is to be committed to the houſe of correction for a month: alſo nets, angles, &c. of poachers, may be ſeized by the owners of rivers, or by any perſons by warrant from a juſtice of peace, &c. 22 & 23 *Car.* II. *c.* 25. 4 & 5 *W.* & *M. c.* 23. The *ſtat.* 4 & 5 *Ann. c.* 21. was made for the increaſe and preſervation of ſalmon in rivers in the counties of Southampton and Wilts; requiring that no ſalmon be taken between the firſt of Auguſt and 12th of November, or under ſize, &c. And, by 1 *Geo.* I. *c.* 18. ſalmon taken in the rivers Severn, Dee, Wye, Were, Ouſe, &c. are to be 18 inches long at leaſt, or the perſons catching them ſhall forfeit 5l. And ſea-fiſh ſold muſt be of the lengths following; *viz.* bret and turbot, 16 inches; brill and pearl, 14; codlin, baſs, and mullet, 12; ſole and plaice, 8; flounders, 7; whiting, 6 inches long, &c. on pain of forfeiting 20s. to the poor, and the fiſh. *Vide* the Statute. Perſons importing any fiſh contrary to *ſtat.* 1 *Geo.* I. *c.* 18. for better preventing freſh fiſh taken by foreigners from being imported into this kingdom, &c. ſhall forfeit 100l. to be recovered in the court at Weſtminſter; one moiety to informers, and the other to the poor; and maſters of ſmacks, hoys, boats, &c. in which the fiſh ſhall be imported, or brought on ſhore, forfeit 50l. Alſo ſelling the ſame in England, liable to 20l. penalty; *Stat.* 9 *Geo.* II. *c.* 33.

By the *ſtat.* 22 *Geo.* II. *c.* 49. contracts for the buying fiſh (except freſh ſalmon, or ſoles brought by land-carriage, oyſters, or ſalt or dried fiſh) to be ſold by retail before the ſame are brought to market, and expoſed to ſale, are declared void; and each party contracting ſhall forfeit 50l. And fiſhermen not ſelling their fiſh within eight days after their arrival on the coaſt between North Yarmouth and Dover, ſhall forfeit the cargo, veſſel, and tackle, &c. And ſea-fiſh, under the dimenſions prohibited by the *ſtat.* 1 *Geo.* I. may be expoſed to ſale, provided they are taken with a hook, and ſo not capable of being preſerved alive. But ſee *ſtat.* 35 *Geo.* II. *c.* 27. made to regulate the ſale of fiſh at the firſt hand in the fiſhmarkets in London and Weſtminſter; and to prevent ſaleſmen of fiſh buying fiſh to ſell again on their own account; and to allow bret, cod, turbot, brill, and pearl, although under the reſpective dimenſions mentioned in 1 *Geo.* I. *c.* 18. to be imported and ſold; and to puniſh perſons who ſhall take or ſell any ſpawn, brood, or fry of fiſh, unſizeable fiſh, or fiſh out of ſeaſon, or ſmelts under the ſize of five inches. By this act, every maſter of a veſſel is to give a true account of the ſeveral ſorts of fiſh brought alive to the *Nore* in his veſſel; and if, after ſuch arrival, he ſhall wilfully deſtroy or throw away any of the ſaid fiſh, not being unwholeſome or unmarketable, &c. he is liable to be committed to the houſe of correction, and kept to hard labour, for any time not exceeding two months, nor leſs than one. And ſee farther, 2 *Geo.* III. *c.* 15. for the better ſupplying the citizens of London and Weſtminſter with fiſh, and to reduce the exorbitant price thereof, and to protect and encourage fiſhermen.

Aman. Acad. tom. iii.

Preſerving of Fish *for Cabinets.* Linnæus's method is, to expoſe them to the air; and when they acquire ſuch a degree of putrefaction that the ſkin loſes its coheſion to the body of the fiſh, it may be ſlid off almoſt like a glove: the two ſides of this ſkin may then be dried upon paper like a plant, or one of the ſides may be filled with plaſter of Paris to give the ſubject a due plumpneſs.

A fiſh may be prepared, after it has acquired this degree of putrefaction, by making a longitudinal inciſion on the belly, and carefully diſſecting the fleſhy part from the ſkin, which are but ſlightly attached to it in conſequence of the putreſcency. The ſkin is then to be filled with cotton and the antiſeptic powder as directed for birds; and, laſtly, to be ſewed up where the inciſion was made. See *Methods of Preſerving* Birds.

Gilding on Fish. In the poſthumous papers of Mr Hooke, a method is deſcribed of gilding live craw-fiſh, carps, &c. without injuring the fiſh. The cement for this purpoſe is prepared, by putting ſome burgundy-pitch into a new earthen pot, and warming the veſſel till it receives ſo much of the pitch as will ſtick round it; then ſtrewing ſome finely-powdered amber over the pitch when growing cold, adding a mixture of three pounds of linſeed oil and one of oil of turpentine, covering the veſſel, and boiling them for an hour over a gentle fire, and grinding the mixture, as it is wanted, with ſo much pumice-ſtone in fine powder as will reduce it to the conſiſtence of paint. The fiſh being wiped dry, the mixture is ſpread upon it; and the gold-leaf being then laid on, and gently preſſed down, the fiſh may be immediately put into water again, without any danger of the gold coming off, for the matter quickly grows firm in water.

Fish, in a ſhip, a plank or piece of timber, faſtened to a ſhip's maſt or yard, to ſtrenthen it; which is done by nailing it on with iron ſpikes, and winding ropes hard about them.

Fishes, in heraldry, are the emblems of ſilence and watchfulneſs; and are borne either upright, imbowed, extended, endorſed reſpecting each other, ſurmounting one another, fretted, &c.

In blazoning fiſhes, thoſe borne feeding, ſhould be termed *devouring;* all fiſhes borne upright and having fins, ſhould be blazoned *hauriant;* and thoſe borne tranverſe the eſcutcheon, muſt be termed *naiant.*

Fish-*Ponds*, thoſe made for the breeding or feeding of fiſh.

Fiſh-ponds are no ſmall improvement of watery and boggy lands, many of which are fit for no other uſe. In making of a pond, its head ſhould be at the loweſt part of the ground, that the trench of the flood-gate or ſluice, having a good fall, may not be too long in emptying. The beſt way of making the head ſecure, is to drive in two or three rows of ſtakes above ſix feet long, at about four feet diſtance from each other, the whole length of the pond-head, whereof the firſt row ſhould be rammed at leaſt about four feet deep. If the bottom is falſe, the foundation may be laid with quicklime; which ſlaking, will make it as hard as a ſtone. Some lay a layer of lime, and another of earth dug out of the pond, among the piles and ſtrakes; and when theſe are well covered, drive in others as they ſee occaſion, ramming in the earth as before, till the pond-head be of the height deſigned.

The dam ſhould be made ſloping on each ſide, leaving a waſte to carry off the over-abundance of water in times of floods or rains; and as to the depth of the pond, the deepeſt part need not exceed ſix feet, riſing gradually in ſhoals towards the ſides, for the fiſh to ſun themſelves, and lay their ſpawn. Gravelly and ſandy bottoms, eſpecially the latter, are beſt for breeding; and a fat ſoil with a white fat water, as the waſhings of hills, commons, ſtreets, ſinks, &c. is beſt for fattening all ſorts of fiſh. For ſtoring a pond, carp is to be preferred for its goodneſs, quick growth, and great increaſe, as breeding five or ſix times a-year. A pond of an acre, if it be a feeding and not breeding one, will every year feed 200 carps of three years old, 300 of two years old, and 400 of a year old. Carps delight in ponds that have marle or clay bottoms, with plenty of weeds and graſs, whereon they feed in the hot months.

Ponds ſhould be drained every three or four years, and the fiſh ſorted. In breeding ones, the ſmaller ones are to be taken out, to ſtore other ponds with; leaving a good ſtock of females, at leaſt eight or nine years old, as they never breed before that age. In feeding ponds, it is beſt to keep them pretty near of a ſize. See Breeding *of Fiſh.*

FISHER (John), biſhop of Rocheſter, was born at Beverly in Yorkſhire, in the year 1459, and educated in the collegiate church of that place. In 1484, he removed to Michael-houſe in Cambridge, of which college he was elected maſter in the year 1495. Having applied himſelf to the ſtudy of divinity, he took orders; and, becoming eminent as a divine, attracted the notice of Margaret, counteſs of Richmond, mother of Henry VII. who made him her chaplain and confeſſor. In 1501, he took the degree of doctor of divinity, and the ſame year was elected chancellor of the univerſity. In the year following, he was appointed Lady Margaret's firſt divinity-profeſſor; and, in 1504, conſecrated biſhop of Rocheſter; which ſmall biſhopric he would never reſign, though he was offered both Ely and Lincoln. It is generally allowed, that the foundation of the two colleges of Chriſt-church and St John's, in Cambridge, was entirely owing to biſhop Fiſher's perſuaſion, and influence with the counteſs of Richmond: he not only formed the deſign, but ſuperintended the execution. On the promulgation of Martin Luther's doctrine, our biſhop was the firſt to enter the liſts againſt him. On this occaſion he exerted all his influence, and is generally ſuppoſed to have written the famous book by which Henry VIII. obtained the title of *Defender of the Faith.* Hitherto he continued in favour with the king; but in 1527, oppoſing his divorce, and denying his ſupremacy, the implacable Harry determined, and finally effected, his deſtruction. In 1534, the parliament found him guilty of miſpriſion of treaſon, for concealing certain prophetic ſpeeches of a fanatical impoſtor, called the *Holy Maid of Kent*, relative to the king's death; and condemned him, with five others, in loſs of goods, and impriſonment during his majeſty's pleaſure; but he was releaſed on paying 300 l. for the king's uſe.

King Henry being now married to Anne Boleyn, his obſequious parliament took an oath of allegiance proper for the occaſion. This oath the biſhop of Rocheſter ſteadily refuſed; alleging, that his conſcience could not be convinced that the king's firſt marriage was againſt the law of God. For refuſing this oath of ſucceſſion, he was attainted by the parliament of 1534; and committed to the Tower, where he was cruelly treated, and where he would probably have died a natural death, had not the pope created him a cardinal. The king, now poſitively determined on his deſtruction, ſent Rich, the ſolicitor-general, under a pretence of conſulting the biſhop on a caſe of conſcience, but really with a deſign to draw him into a converſation concerning the ſupremacy. The honeſt old biſhop ſpoke his mind without ſuſpicion or reſerve, and an indictment and conviction of high-treaſon was the conſequence. He was beheaded on Tower-hill, on the 22d of June 1535, in the 77th year of his age. Thus died this good old prelate; who, notwithſtanding his inflexible enmity to the reformation, was undoubtedly a learned, pious, and honeſt man. He wrote ſeveral treatiſes againſt Luther, and other works, which were printed at Wurtzburgh, in 1597, in one volume folio.

FISHERY, a place where great numbers of fiſh are caught.

The principal fiſheries for ſalmon, herring, mackrel, pilchards, &c. are along the coaſts of Scotland, England, and Ireland; for cod, on the banks of Newfoundland; for whales, about Greenland; and for pearls, in the Eaſt and Weſt Indies.

Fishery, denotes alſo the commerce of fiſh, more particularly the catching them for ſale.

Were we to enter into a very minute and particular conſideration of fiſheries, as at preſent eſtabliſhed in this kingdom, this article would ſwell beyond its proper bounds; becauſe, to do juſtice to a ſubject of ſuch concernment to the Britiſh nation, requires a very ample and diſtinct diſcuſſion. We ſhall, however, obſerve, that ſince the Divine Providence hath ſo eminently ſtored the coaſts of Great Britain and Ireland with the moſt valuable fiſh; and ſince fiſheries, if ſucceſsful, become permanent nurſeries for breeding expert ſeamen; it is not only a duty we owe to the Supreme Being, not to deſpiſe the wonderful plenty he hath afforded us, by neglecting to extends this branch of commerce to the utmoſt; but it is a duty we owe to our country, for its natural ſecurity, which depends upon the ſtrength of our royal navy. No nation can have a navy, where there is not a fund of buſineſs to breed and employ ſeamen without any expence to the public; and no trade is ſo well calculated for training up theſe uſeful members of this ſociety, as fiſheries.

The ſituation of the Britiſh coaſts is the moſt advantageous in the world for catching fiſh: the Scottiſh iſlands, particularly thoſe to the north and weſt, lie moſt commodious for carrying on the fiſhing trade to perfection; for no country in Europe can pretend to come up to Scotland in the abundance of the fineſt fiſh, with which its various creeks, bays, rivers, lakes, and coaſts, are repleniſhed. King Charles I. was ſo ſenſible of the great advantage to be derived from fiſheries, that he began the experiment, together with a company of merchants; but the civil wars ſoon occaſioned that project to be ſet aſide. King Charles II. made a like attempt; but his preſſing wants made him withdraw what money he had employed that way, whereupon the merchants that joined with him did the ſame. Since the union, ſeveral attempts have been made to retrieve the fiſheries, and a corporation ſettled to that effect, entitled the *Royal Britiſh Fiſhery*.

In the year 1750, the parliament of Great Britain taking the ſtate of the fiſheries into conſideration, an act was paſſed for the encouragement of the white-herring fiſhery, granting a charter, whereby a corporation is created, to continue 21 years, by the name of the *Society of the Free Britiſh Fiſhery*, to be under the direction of a governor, preſident, vicepreſident, council, &c. who are to continue in office the ſpace of three years, with power to make bye-laws, &c. and to raiſe a capital of 500,000 l. by way of ſubſcription. And any number of perſons, who, in any part of Great Britain, ſhall ſubſcribe 10,000 l. into the ſtock of this ſociety, under the name of the *fiſhing-chamber*, and carry on the ſaid fiſhery on their own account of profit and loſs, ſhall be entitled to the ſame bounty allowed to the ſociety. The bounty is 30 s. the tun, to be paid yearly, for 14 years, beſides 3 *per cent.* for the money advanced by each chamber. The act contains other proper regulations, relative to the nets, marks on the herring-barrels, number of hands, and the quantity of ſalt that is entitled to the bounty, &c. It is, then, by the encouragement given by this act, that we now ſee a laudable emulation prevailing over the two kingdoms, and fiſhing buſſes fitted out from almoſt every port, in order to repair to the Shetland iſlands, where the herring-fiſhery is carried on with an ardor becoming ſo important a branch of trade. Scotland, which ſuffered incredibly from the neglect of this valuable and natural produce of the ſeas, has not been backward to join in a ſcheme that tends ſo evidently to its own advantage; for the cities of Edinburgh, Glaſgow, the towns of Montroſe, Dundee, Perth, Inverneſs, and ſome other boroughs, have raiſed the proper ſum, and chambers have been erected in each of them; the gentlemen of eſtates adjoining to the reſpective places above-mentioned, liberally contributing with merchants, towards the proſecution of an undertaking ſo viſibly tending to the good of their country in general.

Free **Fishery**, in law, or an excluſive right of fiſhing in a public river, is a royal franchiſe; and is conſidered as ſuch in all countries where the feodal polity has prvailed: though the making ſuch grants, and by that means appropriating, what it ſeems unnatural to reſtrain, the uſe of running water, was prohibited for the future by king John's Great Charter; and the rivers that were fenced in his time were directed to be laid open, as well as the foreſts to be disforeſted. This opening was extended by the ſecond and third charters of Henry III. to thoſe alſo that were fenced under Richard I.; ſo that a franchiſe of free fiſhery ought now to be as old at leaſt as the reign of Henry II. This differs from a *ſeveral of piſcary*, becauſe he that has a ſeveral fiſhery muſt alſo be the owner of the ſoil, which in a free-fiſhery is not requiſite. It differs alſo from a *common* fiſhery, in that the free fiſhery is an excluſive right, the common fiſhery is not ſo: and therefore, in a free fiſhery, a man has a property in the fiſh before they are caught; in a common piſcary, not till afterwards. Some indeed have conſidered a *free* fiſhery not as a royal franchiſe; but merely as a private grant of a liberty to fiſh in the *ſeveral* fiſhery of the granter. But the conſidering ſuch right as originally a flower of the prerogative, till reſtrained by Magna Charta, and derived by royal grant (previous to the reign of Richard I.) to ſuch as now claim it by preſcription, may remove ſome difficulties in reſpect to this matter with which our law-books are embaraſſed.

Blackſt. Comment.

Cod-FISHERY. There are two kinds of cod-fiſh; the one green or white cod, and the other dried or cured cod: tho' it is all the ſame fiſh †, differently prepared; the former being ſometimes ſalted and barrelled, then taken out for uſe; and the latter, having lain ſome competent time in ſalt, dried in the ſun or ſmoke. We ſhall therefore ſpeak of each of theſe apart; and firſt of the

† See *Gadus.*

Green-Cod FISHERY. The chief fiſheries for green cod are in the bay of Canada, on the great bank of Newfoundland, and on the iſle of St Peter, and the iſle of Sable; to which places veſſels reſort from divers parts both of Europe and America. They are from 100 to 150 tons burden, and will catch between 30,000 and 40,000 cod each. The moſt eſſential part of the fiſhery is, to have a maſter who knows how to cut up the cod, one who is ſkilled to take off the head properly, and above all a good ſalter, on which the preſerving of them, and conſequently the ſucceſs of the voyage, depends. The beſt ſeaſon is from the beginning of February to the end of April; the fiſh, which in the winter retire to the deepeſt water, coming then on the banks, and fattening extremely. What is caught from March to June keeps well; but thoſe taken in July, Auguſt, and September, when it is warm on the banks, are apt to ſpoil ſoon. Every fiſher takes but one at a time: the moſt expert will take from 350 to 400 in a day; but that is the moſt, the weight of the fiſh and the great coldneſs on the bank fatiguing very much. As ſoon as the cod are caught, the head is taken off; they are opened, gutted, and ſalted; and the ſalter ſtows them in the bottom of the hold, head to tail, in beds a fathom or two ſquare; laying layers of ſalt and fiſh alternately, but never mixing fiſh caught on different days. When they have lain thus three or four days to drain off the water, they are replaced in another part of the ſhip, and ſalted again; where they remain till the veſſel is loaded. Sometimes they are cut in thick pieces, and put in barrels for the conveniency of carriage.

Dry-Cod FISHERY. The principal fiſhery for this article is, from Cape Roſe to the Bay des Exports, along the coaſt of Placentia, in which compaſs there are divers commodious ports for the fiſh to be dried in. Theſe, though of the ſame kind with the freſh cod, are much ſmaller, and therefore fitter to keep, as the ſalt penetrates more eaſily into them. The fiſhery of both is much alike; only this latter is moſt expenſive, as it takes up more time, and employs more hands, and yet ſcarce half ſo much ſalt is ſpent in this as in the other. The bait is herrings, of which great quantities are taken on the coaſt of Placentia. When ſeveral veſſels meet and intend to fiſh in the ſame port, he whoſe ſhallop firſt touches ground, becomes entitled to the quality and privileges of admiral: he has the choice of his ſtation, and the refuſal of all the wood on the coaſt at his arrival. As faſt as the maſters arrive, they unrig all their veſſels, leaving nothing but the ſhrouds to ſuſtain the maſts; and in the mean time the mates provide a tent on ſhore, covered with branches of trees, and ſails over them, with a ſcaffold of great trunks of pines, 12, 15, 16, and often 20 feet high, commonly from 40 to 60 feet long, and about one third as much in breadth. While the ſcaffold is preparing, the crew are a-fiſhing; and as faſt as they catch, they bring their fiſh aſhore, and open and ſalt them upon moveable benches; but the main ſalting is performed on the ſcaffold. When the fiſh have taken ſalt, they waſh and hang them to drain on rails; when drained, they are laid on kinds of ſtages, which are ſmall pieces of wood laid acroſs, and covered with branches of trees, having the leaves ſtripped off for the paſſage of the air. On theſe ſtages, they are diſpoſed, a fiſh thick, head againſt tail, with the back uppermoſt, and are turned carefully four times every 24 hours. When they begin to dry, they are laid in heaps ten or twelve thick, in order to retain their warmth; and every day the heaps are enlarged, till they become double their firſt bulk; then two heaps are joined together, which they turn every day as before: laſtly, they are ſalted again, beginning with thoſe firſt ſalted; and being laid in huge piles, they remain in that ſituation till they are carried on board the ſhips, where they are laid on the branches of trees diſpoſed for that purpoſe, upon the ballaſt, and round the ſhip, with mats to prevent their contracting any moiſture.

There are four kinds of commodities drawn from cod, *viz.* the zounds, the tongues, the roes, and the oil extracted from the liver. The firſt is ſalted at the fiſhery, together with the fiſh, and put in barrels from 600 to 700 pound. The tongues are done in like manner, and brought in barrels from 400 to 500 pounds. The roes are alſo ſalted in barrels, and ſerve to caſt into the ſea to draw fiſh together, and particularly pilchards. The oil comes in barrels, from 400 to 520 pounds, and is uſed in dreſſing leather.—In Scotland, they catch a ſmall kind of cod on the coaſts of Buchan, and all along the Murray frith on both ſides; as alſo in the frith of Forth, Clyde, &c. which is much eſteemed. They ſalt and dry them in the ſun upon rocks, and ſometimes in the chimney. They alſo cure ſkait, and other ſmaller fiſh in the ſame manner; but moſt of theſe are for home-conſumption.

Herring FISHERY. For the migrations of herrings, and the directions of their courſe, ſee the article CLUPEA. Our great ſtations for this fiſhery are off the Shetland and Weſtern Iſles, and off the coaſt of Norfolk; in which the Dutch alſo ſhare. There are two ſeaſons for fiſhing herring: the firſt from June to the end of Auguſt; and the ſecond in Autumn, when the fogs become very favourable for this kind of fiſhing. The Dutch begin their herring-fiſhing on the 24th of June, and employ a vaſt number of veſſels therein, called *buſſes*, being between 45 and 60 tons burden each, and carrying three or four ſmall cannon. They never ſtir out of port without a convoy, unleſs there be enough together to make about 18 or 20 cannon among them, in which caſe they are allowed to go in company. Before they go out, they make a verbal agreement, which has the ſame force as if it were in writing. The regulations of the admiralty of Holland are partly followed by the French and other nations, and partly improved and augmented with new ones; as, that no fiſher ſhall caſt his net within 100 fathoms of another boat: that while the nets are caſt, a light ſhall be kept on the hind-part of the veſſel: that when a boat is by any accident obliged to leave off fiſhing, the light ſhall be caſt into the ſea: that when the greater part of a fleet leaves off fiſhing, and caſts anchor, the reſt ſhall do the ſame, &c.

Mr Anderſon * gives to the Scots a knowledge of great antiquity in the herring-fiſhery. He ſays that the Netherlanders reſorted to theſe coaſts as early as A. D. 836, to purchaſe ſalted fiſh of the natives; but, impoſing on the ſtrangers, they learned the art, and took up the trade, in after-times of ſuch immenſe emolument to the Dutch.

Sir Walter Raleigh's obſervations on that head, extracted from the ſame author, are extremely worthy the attention of the curious, and excite reflections on the vaſt ſtrength reſulting from the wiſdom of well applied induſtry.

In 1603, remarks that great man, the Dutch ſold to different nations, as many herrings as amounted to L. 1,759,000 Sterling.

In the year 1615, they at once ſent out 2000 buſſes, and employed in them 37,000 fiſhermen.

In the year 1618, they ſent out 3000 ſhips, with 50,000 men to take the herrings, and 9000 more ſhips to tranſport and ſell the fiſh; which by ſea and land employed 150,000 men, beſides thoſe firſt mentioned. All this wealth was gotten on our coaſts; while our attention was taken up in a diſtant whale-fiſhery.

The Scottiſh monarchs for a long time ſeemed to direct all their attention to the preſervation of the ſalmon fiſhery; probably becauſe their ſubjects were ſuch novices in ſea-affairs. At length James III. endeavoured to ſtimulate his great men to theſe patriotic undertakings; for by an act of his third parliament, he compelled "certain lords ſpiritual and temporal, and burrows, to make ſhips, buſſes, and boats, with nets, and other pertinents, for fiſhing. That the ſame ſhould be made in each burgh; in number according to the ſubſtance of each burgh, and the leaſt of them to be of twenty tun: and that all idle men be compelled by the ſheriffs in the country to go on board the ſame."

But his ſucceſſors, by a very falſe policy, rendered this wiſe inſtitution of little effect: for they in a manner prevented their ſubjects from becoming a maritime people, by directing that no white fiſh ſhould be ſent out of the realm, but that ſtrangers may come and buy them; that free ports be firſt ſerved; the cargoes ſold to the freemen, who are to come and tranſport the ſame. The Dutch at this very time had an open trade.

It is well known that there have been many attempts made to ſecure this treaſure to ourſelves, but without ſucceſs. In the late reign, a very ſtrong effort was made, and bounties allowed for the encouragement of Britiſh adventurers: the firſt was of 30s. per ton to every buſs of 70 tons and upwards. This bounty was afterwards raiſed to 50s. per ton, to be paid to ſuch adventurers as were entitled to it by claiming it at the places of rendezvous. The buſſes are from 20 to 90 tons burden, but the beſt ſize is 80. A veſſel of 80 tons ought to take ten laſts, or 120 barrels of herrings, to clear expences, the price of the fiſh to be admitted to be a guinea a barrel. A ſhip of this ſize ought to have 18 men, and three boats: one of 20 tons ſhould have ſix men; and every five tons above, require an additional hand.

To every ton are 280 yards of nets; ſo a veſſel of 80 tons carries 20,000 ſquare yards: each net is 12 yards long, and 10 deep; and every boat takes out from 20 to 30 nets, and puts them together, ſo as to form a long train: they are ſunk at each end of the train by a ſtone, which weighs it down to the full extent: the top is ſupported by buoys, made of ſheeps-ſkin, with a hollow ſtick at the mouth, faſtened tight; through this the ſkin is blown up, and then ſtopped with a peg, to prevent the eſcape of the air. Sometimes theſe buoys are placed at the top of the nets; at other times the nets are ſuffered to ſink deeper, by the lengthening the cords faſtened to them, every cord being for that purpoſe 10 or 12 fathoms long. But the beſt fiſheries are generally in more ſhallow water.

Of the Scots fiſhery in the Weſtern Iſles, the following account is given by Mr Pennant *. "The fiſhing is always performed in the night, unleſs by accident. The buſſes remain at anchor, and ſend out their boats a little before ſun-ſet; which continue out, in winter and ſummer, till day-light; often taking up and emptying their nets, which they do 10 or 12 times in a night, in caſe of good ſucceſs. During winter it is a moſt dangerous and fatiguing employ, by reaſon of the greatneſs and frequency of the gales in theſe ſeas, and in ſuch gales are the moſt ſucceſsful captures: but, by the Providence of heaven, the fiſhers are ſeldom loſt; and, what is wonderful, few are viſited with illneſs. They go out well prepared, with a warm great coat, boots, and ſkin aprons, and a good proviſion of beef and ſpirits. The ſame good fortune attends the buſſes, which in the tempeſtuous ſeaſon, and in the darkeſt nights, are continually ſhifting, in theſe narrow ſeas, from harbour to harbour.

"Sometimes 80 barrels of herrings are taken in a night by the boats of a ſingle veſſel. It once happened, in Loch-Slappan, in Skie, that a buſs of 80 tons might have taken 200 barrels in one night, with 10,000 ſquare yards of net; but the maſter was obliged to deſiſt, for want of a ſufficient number of hands to preſerve the capture.

"The herrings are preſerved by ſalting, after the entrails are taken out: an operation performed by the country people, who get three-halfpence per barrel for their trouble; and ſometimes, even in the winter, can gain fifteen pence a-day. This employs both women and children; but the ſalting is only entruſted to the crew of the buſſes. The fiſh are laid on their backs in the barrels, and layers of ſalt between them. The

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* Hiſt. of Commerce.

* Voyage to the Hebrides, p. 329.

entrails are not loſt, for they are boiled into an oil: 8000 fiſh will yield ten gallons, valued at one ſhilling the gallon.

“ A veſſel of 80 tuns takes out 144 barrels of ſalt: a drawback of 2s. 8d. is allowed for each barrel uſed by the foreign or Iriſh exportation of the fiſh; but there is a duty of 1s. per barrels for the home-conſumption, and the ſame for thoſe ſent to Ireland.

“ The barrels are made of oak-ſtaves, chiefly from Virginia; the hoops from ſeveral parts of our own iſland, and are either of oak, birch, hazel, or willow: the laſt from Holland, liable to a duty.

The barrels coſt about 3s. each: they hold from 500 to 800 fiſh, according to the ſize of the fiſh; and are made to contain 32 gallons. The barrels are inſpected by proper officers: a cooper examines if they are ſtatutable and good; if faulty, he deſtroys them, and obliges the maker to ſtand to the loſs.

“ The herrings in general are exported to the Weſt-Indies, to feed the negroes; or to Ireland, for the Iriſh are not allowed to fiſh in theſe ſeas. By having a drawback of 5d. a barrel, and by repacking the fiſh in new barrels of 28 gallons, they are enabled to export them to our colonies at a cheaper rate than the Scots can do.

“ The trade declines apace; the bounty, which was well paid, originally kept up the ſpirit of the fiſhery; but, for the laſt ſix years, the arrears have been very injurious to ſeveral adventurers, who have ſold out at 30 per cent. loſs, beſides that of their intereſt.

“ Loch-Broom has been celebrated for three or four centuries as the reſort of herrings. They generally appear here in July: thoſe that turn into this bay are part of the brigade that detaches itſelf from the Weſtern column of that great army which annually deſerts the vaſt depths of the arctic circle, and come, heaven-directed, to the ſeats of population, offered as a cheap food to millions, whom waſteful luxury, or iron-hearted avarice, hath deprived, by enhancing the price, of the wonted ſupports of the poor.

“ The migration of theſe fiſh from their Northern retreat is regular; their viſits to the Weſtern iſles and coaſts, certain; but their attachment to one particular loch, extremely precarious. All have their turns: that which ſwarmed with fiſh one year, is totally deſerted the following; yet the next loch to it may be crowded with the ſhoals. Theſe changes of place give often full employ to the buſſes, who are continually ſhifting their harbour in queſt of news reſpecting theſe important wanderers.

“ They commonly appear here in July; the latter end of Auguſt they go into deep water, and continue there for ſome time, without any apparent cauſe: in November, they return to the ſhallows, when a new fiſhery commences, which continues till January; at that time the herrings become full of roe, and are uſeleſs as articles of commerce. Some doubt, whether theſe herrings that appear in November are not part of a new migration; for they are as fat, and make the ſame appearance, as thoſe that compoſed the firſt.

“ The ſigns of the arrival of the herrings are flocks of gulls, who catch up the fiſh while they ſkim on the ſurface; and of gannets, who plunge and bring them up from conſiderable depths. Both theſe birds are cloſely attended to by the fiſhers.

“ Cod-fiſh, haddocks, and dog-fiſh, follow the herrings in vaſt multitudes; theſe voracious fiſh keep on the outſides of the columns, and may be a concurrent reaſon of driving the ſhoals into bays and creeks. In ſummer, they come into the bays generally with the warmeſt weather, and with eaſy gales. During winter, the hard gales from north-weſt are ſuppoſed to aſſiſt in forcing them into ſhelter. Eaſt winds are very unfavourable to the fiſhery.

“ In a fine day, when the fiſh appear near the ſurface, they exhibit an amazing brilliancy of colours; all the various coruſcations that dart from the diamond, ſapphire, and emerald, enrich their tract: but, during night, if they break, *i. e.* play on the ſurface, the ſea appears on fire, luminous as the brighteſt phoſphorus.”

Herrings are cured either white or pickled, or red.

1. Of the firſt, thoſe done by the Dutch are the moſt eſteemed, being diſtinguiſhed into four ſorts, according to their ſizes; and the beſt are thoſe that are fat, fleſhy, firm, and white, ſalted the ſame day they are taken, with good ſalt, and well barrelled. The Britiſh cured herrings are little inferior, if not equal, to the Dutch; for in ſpite of all their endeavours to conceal the ſecret, their method of curing, laſting, or caſking the herrings, has been diſcovered, and is as follows. After they have hauled in their nets, which they drag in the ſtern of their veſſels backwards and forwards in traverſing the coaſt, they throw them upon the ſhip's deck, which is cleared of every thing for that purpoſe: the crew is ſeparated into ſundry diviſions, and each diviſion has a peculiar taſk; one part opens and guts the herrings, leaving the melts and roes; another cures and ſalts them, by lining or rubbing their inſide with ſalt; the next packs them, and between each row and diviſion they ſprinkle handfuls of ſalt; laſtly, the cooper puts the finiſhing hand to all, by heading the caſks very tight, and ſtowing them in the hold.

2. Red herrings muſt lie 24 hours in the brine, in as much as they are to take all their ſalt there; and when they are taken out, they are ſpitted, that is, ſtrung by the head on little wooden ſpits, and then hung in a chimney made for that purpoſe. After which, a fire of bruſh-wood, which yields a deal of ſmoke but no flame, being made under them, they remain there till ſufficiently ſmoked and dried, and are afterwards barrelled up for keeping.

Pearl-FISHERY. See PEARL.

Pilchard FISHERY. The chief-pilchard fiſheries are along the coaſts of Dalmatia, on the coaſt of Bretagne, and along the coaſts of Cornwall and Devonſhire. That of Dalmatia is very plentiful: that on the coaſts of Bretagne employs annually about 300 ſhips. Of the pilchard fiſhery on the coaſt of Cornwall the following account is given by Dr Borlaſe: “ It employs a great number of men on the ſea, training them thereby to naval affairs; employs men, women and children, at land, in ſalting, preſſing, waſhing, and cleaning; in making boats, nets, ropes, caſks, and all the trades depending on their conſtruction and ſale. The poor are fed with the offals of the captures, the land with the refuſe of the fiſh and ſalt; the merchant finds the gains of commiſſion and honeſt commerce, the fiſherman the gains of the fiſh. Ships are often freighted hither with ſalt, and into foreign countries with the fiſh, carrying off at the ſame time part of our tin. The uſual produce of the great number of hogſheads exported each year for ten years from 1747 to 1756 incluſive, from the four ports of Fowy, Falmouth, Penzance, and St Ives, it appears that Fowy has exported yearly 1732 hogſheads; Falmouth, 14,631 hogſheads and two thirds: Penzance and Mounts-Bay, 12,149 hogſheads and one third; St Ives, 1282 hogſheads: in all amounting to 29,795 hogſheads. Every hogſhead for ten years laſt paſt, together with the bounty allowed for each hogſhead exported, and the oil made out of each hogſhead, has amounted, one year with another at an average, to the price of one pound 13 ſhillings and three pence; ſo that the caſh paid for pilchards exported has, at a medium, annually amounted to the ſum of 49,532l. 10s."—The numbers that are taken at one ſhooting out of the nets are amazingly great. Mr Pennant ſays, that Dr Borlaſe aſſured him, that, on the 5th of October 1767, there were at one time incloſed in St Ives's Bay 7000 hogſheads, each hogſhead containing 35,000 fiſh, in all 245 millions.

The pilchards naturally follow the light, which contributes much to the facility of the fiſhery: the ſeaſon is from June to September. On the coaſts of France they make uſe of the roes of the cod-fiſh as a bait; which, thrown into the ſea, makes them riſe from the bottom, and run into the nets. On our coaſts there are perſons poſted aſhore, who, ſpying by the colour of the water where the ſhoals are, make ſigns to the boats to go among them to caſt their nets. When taken, they are brought on ſhore to a warehouſe, where they are laid up in broad piles, ſupported with backs and ſides; and as they are piled, they ſalt them with bay-ſalt; in which lying to ſoak for 30 or 40 days, they run out a deal of blood, with dirty pickle and bittern: then they waſh them clean in ſea-water; and, when dry, barrel and preſs them hard down to ſqueeze out the oil, which iſſues out at a hole in the bottom of the caſk.

Salmon * Fishery. The chief ſalmon-fiſheries in Europe are in England, Scotland, and Ireland, in the rivers, and ſea-coaſts adjoining to the river-mouths. The moſt diſtinguiſhed for ſalmon in Scotland are, the river Tweed, the Clyde, the Tay, the Dee, the Don, the Spey, the Neſs, the Bewly, &c. in moſt of which it is very common, about the height of ſummer, eſpecially if the weather happens to be very hot, to catch four or five ſcore ſalmon at a draught. The chief rivers in England for ſalmon are, the Tyne, the Trent, the Severn, and the Thames. The fiſhing is performed with nets, and ſometimes with a kind of locks or weirs made on purpoſe, which in certain places have iron or wooden grates ſo diſpoſed, in an angle, that being impelled by any force in a contrary direction to the courſe of the river, they may give way and open a little at the point of contact, and immediately ſhut again, cloſing the angle. The ſalmon, therefore, coming up into the rivers, are admitted into theſe grates, which open, and ſuffer them to paſs through, but ſhut again, and prevent their return. The ſalmon is alſo caught with a ſpear, which they dart into him when they ſee him ſwimming near the ſurface of the water. It is cuſtomary likewiſe to catch them with a candle and lanthorn, or wiſp of ſtraw ſet on fire; for the fiſh naturally following the light, are ſtruck with the ſpear, or taken in a net ſpread for that purpoſe, and lifted with a ſudden jerk from the bottom.

" The capture of ſalmon in the Tweed, about the month of July, (ſays Mr Pennant *) is prodigious. In a good fiſhery, often a boat-load, and ſometimes near two, are taken in a tide: ſome few years ago there were above 700 fiſh taken at one hawl, but from 50 to 100 is very frequent. The coopers in Berwick then begin to ſalt both ſalmon and gilſes in pipes and other large veſſels, and afterwards barrel them to ſend abroad, having then far more than the London markets can take off their hands.

" Moſt of the ſalmon taken before April, or to the ſetting in of the warm weather, is ſent freſh to London in baſkets: unleſs now and then the veſſel is diſappointed, by contrary winds, of ſailing immediately; in which caſe the fiſh is brought aſhore again to the coopers offices, and boiled, pickled, and kitted, and ſent to the London markets by the ſame ſhip, and freſh ſalmon put in the baſkets in lieu of the ſtale ones. At the beginning of the ſeaſon, when a ſhip is on the point of ſailing, a freſh clean ſalmon will ſell from a ſhilling to eighteen pence a pound; and moſt of the time that this part of the trade is carried on, the prices are from five to nine ſhillings per ſtone; the value riſing and falling according to the plenty of fiſh, or the proſpect of a fair or foul wind. Some fiſh are ſent in this manner to London the latter end of September, when the weather grows cool; but then the fiſh are full of large roes, grow very thin-bellied, and are not eſteemed either palatable or wholeſome.

" The ſeaſon for fiſhing in the Tweed begins November 30th, but the fiſhermen work very little till after Chriſtmas: it ends on Michaelmas-day; yet the corporation of Berwick (who are conſervators of the river) indulge the fiſhermen with a fortnight paſt that time, on account of the change of the ſtyle.

" There are on the river 41 conſiderable fiſheries, extending upwards, about 14 miles from the mouth, (the others above being of no great value), which are rented for near 5400l. *per annnm:* the expence attending the ſervants wages, nets, boats, &c. amount to 5000l. more; which together makes up the ſum 10,400l. Now, in conſequence, the produce muſt defray all, and no leſs than 20 times that ſum of fiſh will effect it; ſo that 208,000 ſalmon muſt be caught there one year with another.

" Scotland poſſeſſes great numbers of fine fiſheries on both ſides of that kingdom. The Scotch in early times had moſt ſevere laws againſt the killing of this fiſh; for the third offence was made capital, by a law of James IV. Before that, the offender had power to redeem his life. They were thought in the time of Henry VI. a preſent worthy of a crowned head: for in that reign the queen of Scotland ſent to the dutcheſs of Clarence, ten caſks of ſalted ſalmon; which Henry directed to paſs duty-free. The ſalmon are cured in the ſame manner as at Berwick, and a great quantity is ſent to London in the ſpring; but after that time, the adventurers begin to barrel and export them to foreign countries: but we believe that commerce is far leſs lucrative than it was in former times, partly owing to the great increaſe of the Newfoundland fiſhery, and partly to the general relaxation of the diſcipline of abſtinence in the Romiſh church.

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* See Salmo.

* Brit. Zool. iii. 289.

“ Ireland (particularly the north) abounds with this fiſh: the moſt conſiderable fiſhery is at Cranna, on the river Ban, about a mile and an half from Coleraine. When I made the tour of that hoſpitable kingdom in 1754, it was rented by a neighbouring gentleman for 620l. a-year; who aſſured me, that the tenant, his predeceſſor, gave 1600l. *per annum*, and was a much greater gainer by the bargain, for the reaſons before-mentioned, and on account of the number of poachers who deſtroy the fiſh in the fence-months.

“ The mouth of this river faces the north; and is finely ſituated to receive the fiſh that roam along the coaſt, in ſearch of an inlet into ſome freſh water, as they do all along that end of the kingdom which oppoſes itſelf to the northern ocean. We have ſeen near Ballicaſtle, nets placed in the ſea at the foot of the promontories that jut into it, which the ſalmon ſtrike into as they are wandering cloſe to ſhore; and numbers are taken by that method.

“ In the Ban they fiſh with nets 18 ſcore yards long, and are continually drawing night and day the whole ſeaſon, which we think laſts about four months; two ſets of 16 men each alternately relieving one another. The beſt drawing is when the tide is coming in: we were told, that at a ſingle draught there were once 840 fiſh taken.

“ A few miles higher up the river is a wear, where a conſiderable number of fiſh that eſcape the nets are taken. We were lately informed, that, in the year 1760, about 320 tons were taken in the Cranna fiſhery.”

Curing Salmon. When the ſalmon are taken, they open them along the back, take out the guts and gills, and cut out the greateſt part of the bones, endeavouring to make the inſide as ſmooth as poſſible: they then ſalt the fiſh in large tubs for the purpoſe, where they lie a conſiderable time ſoaking in brine; and about October, they are packed cloſe up in barrels, and ſent to London, or exported up the Mediterranean. They have alſo in Scotland, a great deal of ſalmon ſalted in the common way, which after ſoaking in brine a competent time, is well preſſed, and then dried in ſmoke: this is called *kipper*, and is chiefly made for home conſumption; and, if properly cured and prepared, is reckoned very delicious.

Sturgeon † FISHERY. The greateſt ſturgeon-fiſhery is in the mouth of the Volga, on the Caſpian ſea; where the Muſcovites employ a great number of hands, and catch them in a kind of incloſure formed by huge ſtakes repreſenting the letter Z repeated ſeveral times. Theſe fiſheries are open on the ſide next the ſea, and cloſe on the other; by which means the fiſh aſcending in its ſeaſon up the river, is embarraſſed in theſe narrow angular retreats, and ſo is eaſily killed with a harping-iron. Sturgeons, when freſh, eat deliciouſly; and in order to make them keep, they are ſalted or pickled in large pieces, and put up in cags from 30 to 50 pounds. But the great object of this fiſhery is the roe, of which the Muſcovites are extremely fond, and of which is made the cavear, or kavia, ſo much eſteemed by the Italians. See CAVEAR.

† See *Acipenſer.*

Whale * FISHERY. Whales are chiefly caught in the north ſeas: the largeſt ſort are found about Greenland, or Spitzbergen. At the firſt diſcovery of this country, whales not being uſed to be diſturbed, frequently came into the very bays, and were accordingly killed almoſt cloſe to the ſhore; ſo that the blubber being cut off was immediately boiled into oil on the ſpot. The ſhips in thoſe times took in nothing but the pure oil and the whalebone, and all the buſineſs was executed in the country; by which means a ſhip could bring home the product of many more whales than ſhe can according to the preſent method of conducting this trade. The fiſhery alſo was then ſo plentiful, that they were obliged ſometimes to ſend other ſhips to fetch off the oil they had made, the quantity being more than the fiſhing ſhips could bring away. But time and change of circumſtances have ſhifted the ſituation of this trade. The ſhips coming in ſuch numbers from Holland, Denmark, Hamburgh, and other northern countries, all intruders upon the Engliſh, who were the firſt diſcoverers of Greenland, the whales were diſturbed, and gradually, as other fiſh often do, forſaking the place, were not to be killed ſo near the ſhore as before; but are now found, and have been ſo ever ſince, in the openings and ſpace among the ice, where they have deep water, and where they go ſometimes a great many leagues from the ſhore.

* See *Balæna.*

The whale-fiſhery begins in May, and continues all June and July; but whether the ſhips have good or bad ſucceſs, they muſt come away, and get clear of the ice, by the end of Auguſt; ſo that in the month of September at fartheſt, they may be expected home; but a ſhip that meets with a fortunate and early fiſhery in May, may return in June or July.

The manner of taking whales at preſent is as follows.—Every ſhip is provided with ſix boats, to each of which belong ſix men for rowing the boat, and an harpooneer whoſe buſineſs is to ſtrike the whale with his harpoon. Two of theſe boats are kept conſtantly on the watch at ſome diſtance from the ſhip, faſtened to pieces of ice, and are relieved by others every four hours. As ſoon as a whale is perceived, both the boats ſet out in purſuit of it, and if either of them can come up before the whale finally deſcends, which is known by his throwing up his tail, the harpooneer diſcharges his harpoon at him. There is no difficulty in chooſing the place where the whale is to be ſtruck, as ſome have aſſerted; for theſe creatures only come up to the ſurface in order to ſpout up the water, or *blow*, as the fiſhermen term it, and therefore always keep the ſoft and vulnerable part of their bodies above water. A late improvement was made in the method of diſcharging the harpoon; namely, by ſhooting it out of kind of ſwivel or muſquetoon: but it doth not appear, that, ſince this improvement was made, the whale-fiſhing ſhips have had better ſucceſs than before.—As ſoon as the whale is ſtruck, the men ſet up one of their oars in the middle of the boat as a ſignal to thoſe in the ſhip. On perceiving this, the watchman alarms all the reſt with the cry of *fall! fall!* upon which all the other boats are immediately ſent out to the aſſiſtance of the firſt.

The whale finding himſelf wounded, runs off with prodigious violence. Sometimes he deſcends perpendicularly; at others goes off horizontally, at a ſmall depth below the ſurface. The rope which is faſtened to the harpoon is about 200 fathoms long, and properly coiled up, that it may freely be given out as there is a demand for it. At firſt, the velocity with which this line runs over the ſide of the boat is ſo great, that it is wetted to prevent its taking fire: but in a ſhort time the ſtrength of the whale begins to fail, and the fiſhermen, inſtead of letting out more rope, ſtrive as much as poſſible to pull back what is given out already, though they always find themſelves neceſſitated to yield at laſt to the efforts of the animal, to prevent his ſinking their boat. If he runs out the 200 fathoms of line contained in one boat, that belonging to another is immediately faſtened to the end of the firſt, and ſo on; and there have been inſtances, where all the rope belonging to the ſix boats has been neceſſary, though half that quantity is ſeldom required. The whale cannot ſtay long below water, but again comes up to blow; and being now much fatigued and wounded, ſtays longer above water than uſual. This gives another boat time to come up with him, and he is again ſtruck with an harpoon. He again deſcends, but with leſs force than before; and when he comes up again, is generally incapable of deſcending, but ſuffers himſelf to be wounded and killed with long lances which the men are provided with for the purpoſe. He is known to be near death when he ſpouts up the water deeply tinged with blood.

The whale being dead, is laſhed along-ſide the ſhip. They then lay it on one ſide, and put two ropes, one at the head, and the other in the place of the tail, which, together with the fins, is ſtruck off as ſoon as he is taken, to keep thoſe extremities above water. On the off-ſide of the whale are two boats, to receive the pieces of fat, utenſils, and men, that might otherwiſe fall into the water on that ſide. Theſe precautions being taken, three or four men with irons at their feet to prevent ſlipping, get on the whale, and begin to cut out pieces of about three feet thick and eight long, which are hauled up at the capſtane or windlaſs. When the fat is all got off, they cut off the whiſkers of the upper jaw with an ax. Before they cut, they are all laſhed to keep them firm; which alſo facilitates the cutting, and prevents them from falling into the ſea: when on board, five or ſix of them are bundled together, and properly ſtowed; and after all is got off, the carcaſe is turned a-drift, and devoured by the bears, who are very fond of it. In proportion as the large pieces of fat are cut off, the reſt of the crew are employed in ſlicing them ſmaller, and picking out all the lean. When this is prepared, they ſtow it under the deck, where it lies till the fat of all the whales is on board; then cutting it ſtill ſmaller, they put it up in tubs in the hold, cramming them very full and cloſe. Nothing now remains but to ſail homewards, where the fat is to be boiled and melted down into train-oil.

It were in vain to ſpeak in this place of the advantages that may be derived to Great Britain from the whale-fiſhery. We ſhall only remark, that the legiſlature think that trade of ſo great importance, as to grant a very conſiderable bounty for the encouragement of it; for every Britiſh veſſel of 200 tons or upwards, bound to the Greenland ſeas on the whale-fiſhery, if found to be duly qualified according to the act, obtains a licence from the commiſſioners of the cuſtoms to proceed on ſuch voyage: and on the ſhip's return, the maſter and mate making oath that they proceeded on ſuch voyage and no other, and uſed all their endeavours to take whales, &c. and that all the whale-fins, blubber, oil, &c. imported in their ſhip, were taken by their crew in thoſe ſeas, there ſhall be allowed 40 s. for every ton according to the admeaſurement of the ſhip.

Besides theſe fiſheries, there are ſeveral others both on the coaſts of Great Britain and in the North Seas, which, although not much the ſubject of merchandize, nevertheleſs employ great numbers both of ſhips and men; as, 1. The oyſter-fiſhing at Colcheſter, Feverſham, the Iſle of Wight, in the Swales of the Medway, and in all the creeks between Southampton and Chicheſter, from whence they are carried to be fed in pits about Wevenhoe and other places. (See Ostrea.) 2. The lobſter-fiſhing all along the Britiſh Channel, the Frith of Edinburgh, on the coaſt of Northumberland, and on the coaſt of Norway, from whence great quantities are brought to London. (See Cancer.) 3. and laſtly, The fiſhing of the pot-fiſh, fin-fiſh, ſea-unicorn, ſea-horſe, and the ſeal, or dog-fiſh: all which are found in the ſame ſeas with the whales, and yield blubber in a certain degree; beſides, the horn of the unicorn is as eſtimable as ivory, and the ſkins of the ſeals are particularly uſeful to trunk-makers.

FISHING, in general, the art of catching fiſh, whether by means of nets, of ſpears, or of the line and hook.

Fishing in the great, performed by the net, ſpear, or harpoon, has been explained in the preceding article. That performed by the rod, line and hook, is uſually termed Angling: See that article; and for the particular manner of angling for the different kinds of fiſh, ſee their reſpective names, as Dace, Eel, Perch, &c. The following were omitted in their order.

1. The *Barbel**, (ſo called on account of the barb or beard that is under his chops), though a coarſe fiſh, gives conſiderable exerciſe to the angler's ingenuity. They ſwim together in great ſhoals, and are at their worſt in April, at which time they ſpawn, but come ſoon in ſeaſon: the places whither they chiefly reſort, are ſuch as are weedy and gravelly riſing grounds, in which this fiſh is ſaid to dig and root with his noſe like a ſwine. In the ſummer he frequents the ſtrongeſt, ſwifteſt, currents of water; as deep bridges, wears, &c. and is apt to ſettle himſelf amongſt the piles, hollow places, and moſs, or weeds; and will remain there immoveable: but in the winter he retires into deep waters, and helps the female to make a hole in the ſands to hide her ſpawn in, to hinder its being devoured by other fiſh. He is a very curious and cunning fiſh; for if his baits be not ſweet, clean, well-ſcoured, and kept in ſweet moſs, he will not bite; but well-ordered and curiouſly kept, he will bite with great eagerneſs. The beſt bait for him is the ſpawn of a ſalmon, trout, or any other fiſh; and if you would have good ſport with him, bait the places where you intend to fiſh with it a night or two before, or with large worms cut in pieces; and the earlier in the morning or the later in the evening that you fiſh, the better it will be. Your rod and line muſt be both ſtrong and long, with a running plummet on the line; and let a little bit of lead be placed a foot or more above the hook, to keep the bullet from falling on it: ſo the worm will be at the bottom, where they always bite; and when the

* See *Cyprinus.*

Sportſm. Dict.

the fiſh takes the bait, your plummet will lie and not choke him. By the bending of your rod you may know when he bites, as alſo with your hand you will feel him make a ſtrong ſnatch; then ſtrike, and you will rarely fail, if you play him well; but, if you manage him not dexterouſly, he will break your line. The beſt time of fiſhing is about nine in the morning, and the moſt proper ſeaſon is the latter end of May, June, July, and the beginning of Auguſt.

2. The *Bleak* *, is an eager fiſh, caught with all ſorts of worms bred on trees or plants; as alſo with flies, paſte, ſheep's blood, &c. They may be angled for with half a ſcore of hooks at once, if they can be all faſtened on: he will alſo in the evening take a natural or artificial fly. If the day be warm and clear, there is no fly ſo good for him as the ſmall fly at the top of the water, which he will take at any time of the day, eſpecially in the evening: but if the day is cold and cloudy, gentles and caddis are the beſt; about two feet under water. No fiſh yields better ſport to a young angler than the bleak. It is ſo eager, that it will leap out of the water for a bait.

There is another way of taking bleak, which is by whipping them in a boat, or on a bank-ſide in freſh water in a ſummer's evening, with a hazel top about five or ſix feet long and a line twice the length of the rod. But the beſt method is with a drabble, thus: Tie eight or ten ſmall hooks acroſs a line two inches above one another; the biggeſt hook the lowermoſt, (whereby you may ſometimes take a better fiſh), and bait them with gentles, flies, or ſome ſmall red worms, by which means you may take half a dozen or more at a time.

3. For the *Bream* †, obſerve the following directions, which will alſo be of uſe in carp-fiſhing.—Procure about a quart of large red worms; put them into freſh moſs well waſhed and dried every three or four days, feeding them with fat mould and chopped fennel, and they will be thoroughly ſcoured in about three weeks.

Let your lines be ſilk and hair, but all ſilk is the beſt: let the floats be either ſwan-quills, or gooſe-quills. Let your plumb be a piece of lead in the ſhape of a pear, with a ſmall ring at the little end of it: faſten the lead to the line, and the line-hook to the lead, about ten or twelve inches ſpace between lead and hook will be enough; and take care the lead be heavy enough to ſink the float. Having baited your hook well with a ſtrong worm, the worm will draw the hook up and down in the bottom, which will provoke the bream to bite the more eagerly. It will be be beſt to fit up three or four rods and lines in this manner, and ſet them as will be directed, and this will afford you much the better ſport. Find the exact depth of the water if poſſible, that your float may ſwim on its ſurface directly over the lead; then provide the following ground-bait: take about a peck of ſweet groſs-ground malt; and having boiled it a very little, ſtrain it hard through a bag, and carry it to the water-ſide where you have ſounded; and in the place where you ſuppoſe the fiſh frequent, there throw in the malt by handfuls ſqueezed hard together, that the ſtream may not ſeparate it before it comes to the bottom; and be ſure to throw it in at leaſt a yard above the place where you intend the hook ſhall lie, otherwiſe the ſtream will carry it down too far. Do this about nine o'clock at night, keeping ſome of the malt in the bag; and go to the place about three the next morning: but approach very warily, leſt you ſhould be ſeen by the fiſh; for it is certain, that they have their centinels watching on the top of the water, while the reſt are feeding below. Having baited your hook ſo that the worm may crawl to and fro, the better to allure the fiſh to bite, caſt it in at the place where you find the fiſh to ſtay moſt, which is generally in the broadeſt and deepeſt part of the river, and ſo that it may reſt about the midſt of your bait that is on the ground. Caſt in your ſecond line ſo that it may reſt a yard above that, and a third about a yard below it. Let your rods lie on the bank with ſome ſtones to keep them down at the great ends; and then withdraw yourſelf, yet not ſo far but that you can have your eye upon all the floats: and when you ſee one bitten and carried away, do not be too haſty to run in, but give time to the fiſh to tire himſelf, and then touch him gently. When you perceive the float ſink, creep to the water-ſide, and give it as much line as you can. If it is a bream or carp, they will run to the other ſide; which ſtrike gently, and hold your rod at a bent a little while; but do not pull, for then you will ſpoil all; but you muſt firſt tire them before they can be landed, for they are very ſhy. If there are any carps in the river, it is an even wager that you take one or more of them: but if there are any pike or perch, they will be ſure to viſit the ground-bait, though they will not touch it, being drawn thither by the great reſort of the ſmall fiſh; and until you remove them, it is in vain to think of taking the bream or carp. In this caſe, bait one of your hooks with a ſmall bleak, roach, or gudgeon, about two foot deep from your float, with a little red worm at the point of your hook; and if a pike be there, he will be ſure to ſnap at it. This ſport is good till nine o'clock in the morning; and, in a gloomy day, till night: but do not frequent the place too much, leſt the fiſh grow ſhy.

4. The *carp* *. A perſon who angles for carp muſt arm himſelf with abundance of patience, becauſe of its extraordinary ſubtilty and policy: they always chooſe to lie in the deepeſt places, either of ponds or rivers, where there is but a ſmall running ſtream.

Further, obſerve, that they will ſeldom bite in cold weather; and you cannot be too early or too late at the ſport in hot weather: and if he bite, you need not fear his hold; for he is one of thoſe leather-mouthed fiſh that have their teeth in their throat.

Neither muſt you forget, in angling for him, to have a ſtrong rod and line; and ſince he is ſo very wary, it will be proper to entice him, by baiting the ground with a coarſe paſte.

He ſeldom refuſes the red worm in March, the caddis in June, nor the graſhopper in June, April, and September.

This fiſh does not only delight in worms, but alſo in ſweet paſte; of which there is great variety: the beſt is made of honey and ſugar, and ought to be thrown into the water ſome hours before you begin to angle; neither will ſmall pellets thrown into the water two or three days before be worſe for this purpoſe, eſpecially if chickens guts, garbage, or blood mixed with bran and cow-dung, be alſo thrown in.

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* See *Cyprinus*.

† See *Cyprinus*.

† See Carp and Cyprinus.

Sportſm. Dict.

But more particularly, as to a paſte very proper for this uſe, you may make it in the manner following: Take a ſufficient quantity of flour, and mingle it with veal, cut ſmall, making it up with a compound of honey; then pound all together in a mortar till they are ſo tough as to hang upon the hook without waſhing off. In order to effect which the better, mingle whitiſh wool with it; and if you keep it all the year round, add ſome virgin wax and clarified honey.

Again, if you fiſh with gentles, anoint them with honey, and put them on your hook, with a deep ſcarlet dipped in the like, which is a good way to deceive the fiſh.

Honey and crumbs of white-bread, mixed together, make alſo a very good paſte.

In taking a carp either in pond or river, if the angler intends to add profit to his pleaſure, he muſt take a peck of ale-grains, and a good quantity of any blood to mix with the grains, baiting the ground with it where he intends to angle. This food will wonderfully attract the ſcale-fiſh, as carp, tench, roach, dace, and bream.

Let him angle in a morning, plumbing his ground, and angling for carp with a ſtrong line: the bait muſt be either paſte, or a knotted red worm; and by this means he will have ſport enough.

5. The *chub*, or *chevin* *, is a very ſtrong, though inactive fiſh, yielding in a very little time after he is ſtruck; and the larger he is, the more quietly he is taken. As for his food, he loves all ſorts of worms and flies; alſo cheeſe, grain, and black worms, their bellies being ſlit that the white may appear. He is to be angled for early in the morning with ſnails: but in the heat of the day make uſe of ſome other bait; and in the afternoon, fiſh for him at ground or with fly; of the laſt of which there is none he covets more than a moth with a great head, whoſe body is yellow, with whitiſh wings, which is commonly found in gardens about the evening.

Deſcription of proper Baits for the ſeveral ſorts of FISH *referred to in the annexed Table.*

Flies.] 1. Stone-fly, found under hollow ſtones at the ſide of rivers, is of a brown colour, with yellow ſtreaks on the back and belly, has large wings, and is in ſeaſon from April to July. 2. Green-drake, found among ſtones by river-ſides, has a yellow body ribbed with green, is long and ſlender, with wings like a butterfly, his tail turns on his back, and from May to Midſummer is very good. 3. Oak-fly, found in the body of an old oak or aſh, with its head downwards, is of a brown colour, and excellent from May to September. 4. Palmer-fly or worm, found on leaves of plants, is commonly called a *caterpillar*, and when it comes to a fly is excellent for trout. 5. Ant-fly, found in ant-hills from June to September. 6. The May-fly is to be found playing at the river-ſide, eſpecially againſt rain. 7. The black-fly is to be found upon every hawthorn, after the buds are come off.

Paſtes.] 1. Take the blood of ſheeps hearts, and mix it with honey and flour worked to a proper conſiſtence. 2. Take old cheeſe grated, a little butter ſufficient to work it, and colour it with ſaffron: in winter uſe ruſty bacon inſtead of butter. 3. Crumbs of bread chewed or worked with honey, (or ſugar), moiſtened with gum-ivy water. 4. Bread chewed, and worked in the hand till ſtiff.

Worms.] 1. The earth-bob, found in ſandy ground after ploughing; it is white, with a red head, and bigger than a gentle: another is found in heathy ground, with a blue head. Keep them in an earthen veſſel well covered, and a ſufficient quantity of the mould they harbour in. They are excellent from April to November. 2. Gentles, to be had from putrid fleſh: let them lie in wheat-bran a few days before uſed. 3. Flag-worms, found in the roots of flags; they are of a pale yellow colour, are longer and thinner than a gentle, and muſt be ſcowered like them. 4. Cow-turd-bob, or clap-bait, found under a cow-turd from May to Michaelmas; it is like a gentle, but larger. Keep it in its native earth like the earth-bob. 5. Cadis-worm, or cod-bait, found under looſe ſtones in ſhallow rivers; they are yellow, bigger than a gentle, with a black or blue head, and are in ſeaſon from April to July. Keep them in flannel bags. 6. Lob-worm, found in gardens; it is very large, and has a red-head, a ſtreak down the back, and a flat broad tail. 7. Marſh-worms, found in marſhy ground: keep them in moſs ten days before you uſe them: their colour is a bluiſh red, and are a good bait from March to Michaelmas. 8. Brandling red-worms, or blood-worms, found in rotten dunghills and tanners bark; they are ſmall red-worms, very good for all ſmall fiſh, have ſometimes a yellow tail, and are called *tag-tail*.

Fiſh and inſects.] 1. Minnow. 2. Gudgeon. 3. Roach. 4. Dace. 5. Smelt. 6. Yellow frog. 7. Snail ſlit. 8. Graſshopper.

FISHING-*Fly*, a bait uſed in angling for divers kinds of fiſh. See FISHING.

The fly is either *natural* or *artificial*.

I. *Natural* flies are innumerable. The more uſual for this purpoſe are mentioned in the preceding column.

There are two ways to fiſh with natural flies; either on the ſurface of the water, or a little underneath it.

In angling for chevin, roach, or dace, move not your natural fly ſwiftly, when you ſee the fiſh make at it; but rather let it glide freely towards him with the ſtream: but if it be in a ſtill and ſlow water, draw the fly ſlowly ſidewiſe by him, which will make him eagerly purſue.

II. The *artificial* fly is ſeldom uſed but in bluſtering weather, when the waters are ſo troubled by the winds, that the natural fly cannot be ſeen, nor reſt upon them. Of this artificial fly there are reckoned no leſs than 12 ſorts, of which the following are the principal.

1. For March, the dun-fly; made of dun-wool, and the feathers of the patridge's wing; or the body made of black wool, and the feathers of a black drake. 2. For April, the ſtone-fly; the body made of black wool, dyed yellow under the wings and tail. 3. For the beginning of May, the ruddy fly; made of red wool, and bound about with black ſilk, with the feathers of a black capon hanging dangling on his ſides next his tail. 4. For June, the greeniſh fly; the body made of black wool, with a yellow liſt on either ſide, the wings taken off the wings of a buzzard, bound with black broken hemp. 5. The mooriſh fly, the body made of duſkiſh wool, and the wings of the blackiſh mail of

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* See Cyprinus.

An Epitome of the whole art of **Fishing**, wherein is ſhewn (at one view), the harbours, ſeaſons, and depths, for catching all ſorts of fiſh uſually angled for; alſo the various baits for each, ſo digeſted as to contain the eſſence of all the treatiſes ever wrote on the ſubject, exempt from their ſuperfluities, which tend more to perplex than inſtruct.

Names.	Where found.	Seaſon.	Time to ang.	Depth from ground.	Proper Baits.			
					Flies. No.	Paſtes. No.	Worms. No.	Fiſh and Inſects. No. 8
Bream	rough ſtr. river or mid. pond	April to Mich.	Sun-riſe to 9 3 to Sun-ſet	touch ground	—	1 3	1 to 7	
Barbel	gravel-banks in currents under bridges	April to Aug.	very early or late	ditto	—	2	2 6 7	—
Bleak	ſandy bottom, deep rivers, ſhips ſterns	May to Oct.	all day	6 inches from bottom	1 2	2	2 3 8	—
Carp	ſtill deep mud-bottom, pond or river	May to Aug.	Sun-riſe to 9 3 to Sun-ſet	3 inches from bottom hot weather, mid-water	—	1 3 4	1 2 3 4 7	—
Chub or Chevin	ditto	May to Dec.	ditto	ditto	1 to 5	2	1 2 4 5	7 8
Dace	ſandy bottom, deep rivers, ſhips ſterns	May to Oct.	all day	6 to 12 inches from bottom	ditto	3 4	1 to 5 & 8	—
Gudgeon	gravel ſhoals	May to Oct.	ditto	near or on ground	—	ditto	2 8	—
Pike	near clay-banks	All the year.	ditto	mid-water	wh. ſtro. and ſnap	line float hook fixt	on ſhore	1 2 3 4 5 6 7
Pearch	river in ſtream pond deepeſt part } gravel or weedy bottom	May to Aug. Aug. to May.	S.-riſe to 10 2 to Sun-ſet	ditto 6 inches from bottom	2	1	3 5 7 8	1 6
Pope	deep holes in rivers	May to Oct.	mid-day	ditto	5	—	all	—
Roach	ſandy bottom, deep river, ſhips ſterns	May to Oct.	all day ditto	6 to 12 inches	1 2 4 5	3 4	ditto	8
Salmon	deep rivers	Mar. to Sept.	8 to 9, 3 to 6	mid-way to the bottom	all large	—	1 5 6 7	1
Smelts	ſhips ſterns and docks	Apr. to Oct.	all day	mid-way to the bottom variable	all ſmall	—	1 2 5	bits of ſmelts
Trout	purling ſtream and eddies of ſtony bottom river	Mar. to Mich.	ditto	cold weather 6 inches to 9 hot weather, top to mid-wat.	1 to 5	—	1 2 5 to 8	1 8
Tench	mud-bottom river or pond	All the year	Sun-riſe to 9 3 to Sun-ſet	cold wea. 3 inch. from bot. hot-weather mid-water	—	1 3 4	1 3 4 to 7	—
Umber or Grayling	clay bottom, ſwift ſtream	All the year	all day	cold weather, 6 to 9 inches hot weather, top to mid-wat.	1 to 5	—	all	1 8

Sportſm. Dict.

a drake. 6. The tawny fly, good till the middle of June; the body made of tawny wool, the wings made contrary one againſt the other, of the whitiſh mail of a white drake. 7. For July, the waſp-fly; the body made of black wool, caſt about with yellow ſilk, and the wings of drakes feathers. 8. The ſteel-fly, good in the middle of July; the body made with greeniſh wool, caſt about with the feathers of a peacock's tail, and the wings made of thoſe of the buzzard. 9. For Auguſt, the drake-fly; the body made with black wool caſt about with black ſilk; his wings of the mail of a black drake, with a black head.

The beſt rules for artificial fly-fiſhing are,

1. To fiſh in a river ſomewhat diſturbed with rain:

or in a cloudy day, when the waters are moved by a gentle breeze: the ſouth wind is beſt; and if the wind blow high, yet not ſo but that you may conveniently guard your tackle, the fiſh will riſe in plain deeps; but if the wind be ſmall, the beſt angling is in ſwift ſtreams. 2. Keep as far from the water-ſide as may be; fiſh down the ſtream with the ſun at your back, and touch not the water with your line. 3. Ever angle in clear rivers, with a ſmall fly and ſlender wings; but in muddy, places uſe a larger. 4. When, after rain, the water becomes browniſh, uſe an orange fly; in a clear day, a light-coloured fly; a dark fly for dark waters, &c. 5. Let the line be twice as long as the rod, unleſs the river be encumbered with wood. 6. For every ſort of fly, have ſeveral of the ſame, differing in colour, to ſuit with the different complexions of ſeveral waters and weathers. 7. Have a nimble eye, and active hand, to ſtrike preſently with the riſing of the fiſh; or elſe he will be apt to ſpue out the hook. 8. Let the fly fall firſt into the water, and not the line, which will ſcare the fiſh. 9. In ſlow rivers, or ſtill places, caſt the fly a-croſs the river, and let it ſink a little in the water, and draw it gently back with the current.

Salmon-flies ſhould be made with their wings ſtanding one behind the other, whether two or four. This fiſh delights in the gaudieſt colours that can be; chiefly in the wings, which muſt be long, as well as the tail.

Fishing-*Floats*, are little appendages to the line, ſerving to keep the hook and bait ſuſpended at the proper depth, to diſcover when the fiſh has hold of them, &c. Of theſe there are divers kinds; ſome made of Muſcovy-duck quills, which are the beſt for ſlow waters; but for ſtrong ſtreams, ſound cork, without flaws or holes, bored through with an hot iron, into which is put a quill of a fit proportion, is preferable: pare the cork to a pyramidal form, and make it ſmooth.

Fishing-*Hook*, a ſmall inſtrument made of ſteel-wire, of a proper form to catch and retain fiſh.

The fiſhing-hook, in general, ought to be long in the ſhank, ſomewhat thick in the circumference, the point even and ſtraight; let the bending be in the ſhank.

For ſetting the hook on, uſe ſtrong, but ſmall ſilk, laying the hair on the inſide of your hook; for if it be on the outſide, the ſilk will fret and cut it aſunder.

There are ſeveral ſizes of theſe fiſhing-hooks, ſome big, ſome little: and of theſe, ſome have peculiar names; as, 1. Single hooks. 2. Double hooks; which have two bendings, one contrary to the other. 3. Snappers, or gorgers, which are the hooks to whip the artificial fly upon, or bait with the natural fly. 4. Springers, or ſpring-hooks; a kind of double hooks, with a ſpring, which flies open upon being ſtruck into any fiſh, and ſo keep its mouth open.

Fishing-*Line*, is either made of hair, twiſted; or ſilk; or the Indian graſs.—The beſt colours are the ſorrel, white, and grey; the two laſt for clear waters, the firſt for muddy ones. Nor is the pale watery green deſpiſable; this colour is given artificially, by ſteeping the hair in a liquor made of alum, ſoot, and the juice of walnut-leaves, boiled together.

Fishing-*Rod*, a long ſlender rod or wand, to which the line is faſtened, for angling.—Of theſe there are ſeveral ſorts; as, 1. A troller, or trolling-rod, which has a ring at the end of the rod, for the line to go thro' when it runs off a reel. 2. A whipper, or whipping-rod; a top-rod, that is weak in the middle, and top-heavy, but all ſlender and fine. 3. A dropper; which is a ſtrong rod and very light. 4. A ſnapper, or ſnap-rod; which is a ſtrong pole, peculiarly uſed for the pike. 5. A bottom-rod; being the ſame as the dropper, but ſomewhat more pliable. 6. A ſniggling or procking ſtick; a forked ſtick, having a ſhort ſtrong line, with a needle, baited with a lobe worm: this is only for eels in their holes.

Fishing-*Frog*, or *Angler*. See Lophius.

Right of Fishing, and property of fiſh. It has been held, that where the lord of the manor hath the ſoil on both ſides of the river, it is a good evidence that he hath a right of fiſhing; and it puts the proof upon him who claims *liberam piſcariam*: but where a river ebbs and flows, and is an arm of the ſea, there it is common to all, and he who claims a privilege to himſelf muſt prove it; for if the treſpaſs is brought for fiſhing there, the defendant may juſtify, that the place where is *brachium maris, in quo unuſquiſque ſubditus domini regis habet et habere debet liberam piſcariam.* In the Severn the ſoil belongs to the owners of the land on each ſide; and the ſoil of the river Thames is in the king, but the fiſhing is common to all. He who is owner of the ſoil of a private river, hath *ſeparalis piſcaria*; and he that hath *libera piſcaria*, hath a property in the fiſh, and may bring a poſſeſſory action for them; but *communis piſcaria* is like the caſe of all other commons. One that has a cloſe pond in which there are fiſh, may call them *piſces ſuos*, in an indictment, &c. but he cannot call them *bona & catalla*, if they be not in trunks. There needs no privilege to make a fiſh-pond, as there doth in the caſe of a warren. See Franchise.

Jacob's Law Dict.

FISSURES, in the hiſtory of the earth, certain interruptions, that in an horizontal or parallel manner divide the ſeveral ſtrata of which the body of our terreſtrial globe is compoſed.

Fissure *of the Bones*, in ſurgery, is when they are divided either tranſverſely or longitudinally, not quite through, but cracked after the manner of glaſs, by any external force. See Surgery.

FISTULA, in the ancient muſic, an inſtrument of the wind-kind, reſembling our flute or flageolet.

The principal wind-inſtruments of the ancients, were the tibia and the fiſtula. But how they were conſtituted, wherein they differed, or how they were played upon, does not appear.

Fistula, in ſurgery, a deep, narrow, and callous ulcer, generally ariſing from abſceſſes.

It differs from a *ſinus*, in its being callous, the latter not. See Surgery.

Fistula, in farriery. See Farriery, § xxxi.

FISTULARIA, or Tobacco-pipe Fish; a genus of fiſhes, belonging to the order of abdominales. Of this genus Linnæus reckons two ſpecies; but we have a deſcription only of one, viz. the tabacaria. It is deſcribed by Mr Cateſby, from the only one he ever ſaw. It was almoſt a foot in length; the fore-part from the noſe to half-way the body of nearly equal bigneſs; from whence it grew tapering to the tail, which was forked, and from which grew a ſlender taper whip, four inches long, of the conſiſtence of whalebone; the mouth narrow, from which to the eyes was almoſt three inches. The whole fiſh was of a brown colour. They are ſometimes taken on the coaſts of Jamaica.

Pl. CVIII. fig 2.

FIT. See Paroxyſm.

Dr Cheyne is of opinion that fits of all kinds, whether epileptic, hyſteric, or apoplectic, may be cured ſolely by a milk-diet, of about two quarts of cows milk a-day, without any other medicine.

FITCHY, in heraldry, (from the French *fiſché*, i. e. *fixed*); a term applied to a croſs when the lower branch ends in a ſharp point: and the reaſon of it Mackenzie ſuppoſes to be, that the primitive Chriſtians were wont to carry croſſes with them wherever they went; and when they ſtopped on their journey at any place, they fixed thoſe portable croſſes in the ground for devotion's ſake.

FITCHES, in huſbandry, a ſort of pulſe, more generally known by the name of *chick-pea*. See Cicer.

Fitches are cultivated either for feeding cattle, or improving the land. They make a wholeſome and nouriſhing food, whether given in the ſtraw or threſhed out. When ſown only to improve the ſoil, they are ploughed in juſt as they begin to bloſſom, by which means a tough ſtiff clay-ſoil is much enriched.

FITCHET, a name uſed in ſome places for the weaſel, called alſo the *foumart*. See Muſtela.

FITZ, makes part of the ſurname of ſome of the natural ſons of the kings of England, as *Fitz-roy*; which is purely French, and ſignifies the "king's ſon."

FITZHERBERT (Sir Anthony), a very learned lawyer in the reign of king Henry VIII. was deſcended from an ancient family, and born at Norbury in Derbyſhire. He was made one of the judges of the court of common-pleas in 1523; and diſtinguiſhed himſelf by many valuable works, as well as by ſuch an honourable diſcharge of the duties of his office, as made him eſteemed an oracle of the law. His writings are, *The Grand Abridgment; The Office and Authority of Juſtices of Peace; the Office of Sheriffs, Bailiffs of Liberties, Eſcheators, Conſtables, Coroners*, &c.; *Of the Diverſity of Courts*; *The New Natura Brevium; Of the Surveying of Lands*; and *The Book of Huſbandry*. He died in 1538.

FITZ-STEPHEN (William), a learned monk of Canterbury, of Norman extraction, but born of reſpectable parents in the city of London. He lived in the 12th century; and being attached to the ſervice of archbiſhop Becket, was preſent at the time of his murder. In the year 1174, he wrote in Latin, *The Life of St Thomas, archbiſhop and martyr*; in which, as Becket was a native of the metropolis, he introduces a deſcription of the city of London, with a miſcellaneous detail of the manners and uſages of the citizens: this is deſervedly conſidered as a great curioſity, being the earlieſt profeſſed account of London extant. Fitz-Stephen died in 1191.

FIVES, or Vives. See Farriery, ſect. x. 10.

FIXATION, in chemiſtry, the rendering any volatile ſubſtance fixed, ſo as not to fly off upon being expoſed to a great heat; hence,

FIXED bodies, are thoſe which bear a conſiderable degree of heat without evaporating, or loſing any of their weight. Among the moſt fixed bodies are diamonds, gold, &c. See Diamond, Gold, &c.

Fixed *Air*. See Air, and Gas.

Fixed *Stars*, are ſuch as conſtantly retain the ſame poſition and diſtance with reſpect to each other*; by which they are contradiſtinguiſhed from *erratic* or *wandering* ſtars, which are continually ſhifting their ſituation and diſtance.—The fixed ſtars are what we properly and abſolutely call *ſtars*: the reſt have their peculiar denominations of *planet*, and *comet*. See Astronomy, n° 40, 44, 46, &c.

FLACCUS (Caius Valerius), an ancient Latin poet, of whom we have very imperfect accounts remaining. He wrote a poem on the Argonautic expdition; of which, however, he did not live to finiſh the eighth book, dying at about 30 years of age. John Baptiſta Pius, an Italian poet, completed the eighth book of the Argonautics; and added two more, from the fourth of Apollonius; which ſupplement was firſt added to Aldus's edition in 1523.

FLAG or Slate *Stone*, common in Northumberland and ſome of the neighbouring counties, is called by ſome the *Carliſle flag*. Its ſtrata are very thick; but they ſometimes ſeparate into laminæ of about half an inch thick, and the workmen ſeldom attempt to ſplit it any thinner: the upper ſtrata, however, grow gradually thinner. The bottom ones are ſo thick, that they cannot be made uſe of for ſlates; but are uſed for tanners vats, the pavements of floors, and ciſterns for water.

Flag, is alſo uſed for ſedge, a kind of ruſh.

Flags, in the army, are ſmall banners of diſtinction ſtuck in the baggage-waggons, to diſtinguiſh the baggage of one brigade from another, and of one battalion from another; that they may be marſhalled by the waggon-maſter general according to the rank of their brigades, to avoid the confuſion that might otherwiſe ariſe.

Flag, in the marine, a certain banner or ſtandard, by which an admiral is diſtinguiſhed at ſea from the inferior ſhips of his ſquadron; alſo the colours by which one nation is diſtinguiſhed from another. See Plate CIX.

In the Britiſh navy, flags are either red, white, or blue; and are diſplayed from the top of the main-maſt, fore-maſt, or mizen-maſt, according to the rank of the admiral. When a flag is diſplayed from the flag-ſtaff on the main-maſt, the officer diſtinguiſhed thereby is known to be an admiral; when from the fore-maſt, a vice-admiral; and when from the mizen-maſt, a rear-admiral.

The firſt flag in Great Britain is the royal ſtandard, which is only to be hoiſted when the king or queen are on board the veſſel: the ſecond is that of the anchor of hope, which characteriſes the lord high admiral, or lords commiſſioners of the admiralty: and the third is the union-flag, in which the croſſes of St George and St Andrew are blended. This laſt is appropriated to the admiral of the fleet, who is the firſt military officer under the lord high admiral.

The next flag after the union is that of the white ſquadron, at the main-maſt head; and the laſt, which characteriſes an admiral, is the blue, at the ſame maſt-head.

For a vice-admiral, the firſt flag is the red, the ſecond the white, the third the blue, at the flag-ſtaff on the fore-maſt.

The ſame order proceeds with regard to the rear-admirals, whoſe flags are hoiſted on the top of the mizen-maſt: the loweſt flag in our navy is accordingly the blue on the mizen-maſt.

To Lower or Strike the Flag, in the marine, is to pull it down upon the cap, or to take it in, out of the

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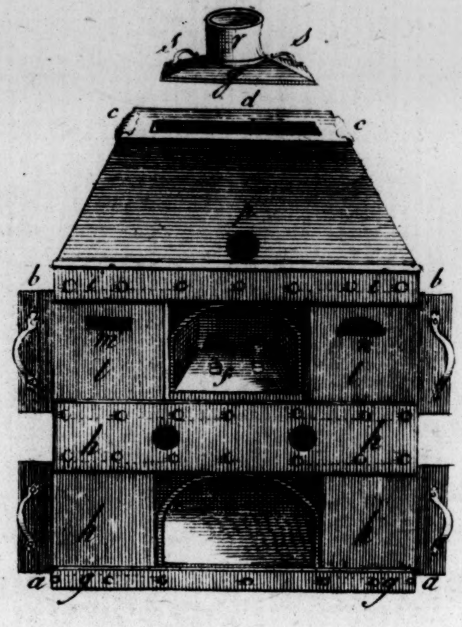
* See *Aſtronomy*, n° 65, &c.

Plate CVIII.

Fig. 4.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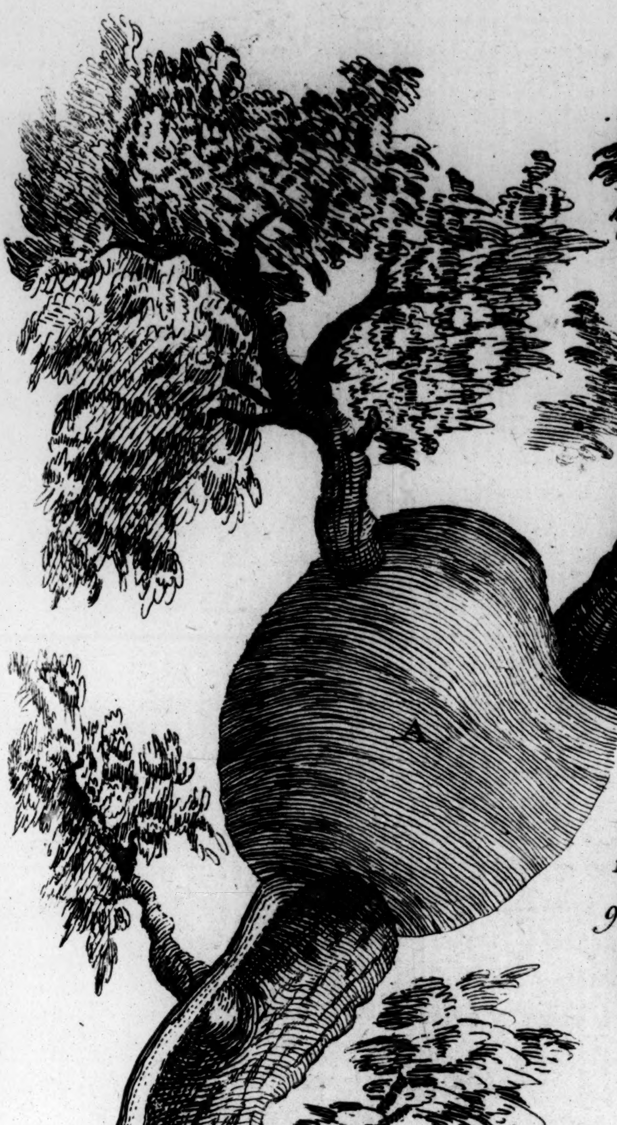


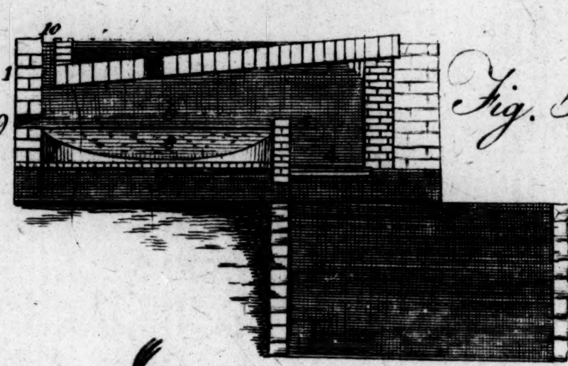


Fig. 5.

Fig. 6.

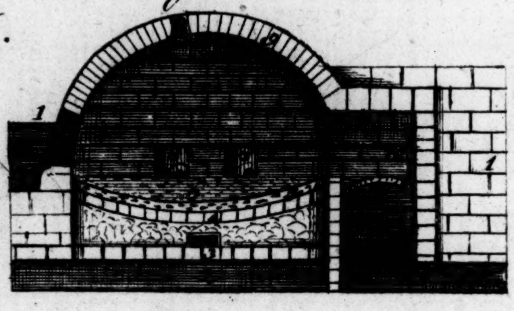


Fig. 1.
FELIS LINX

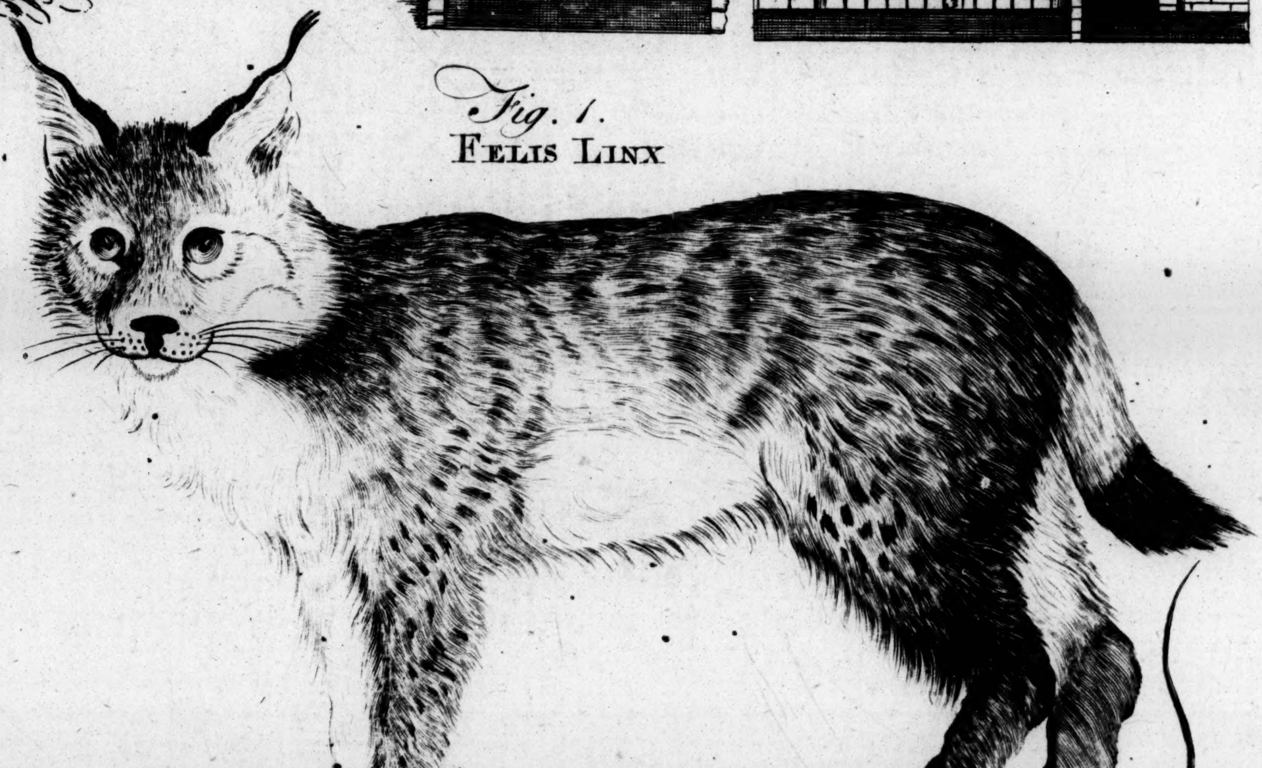


Fig. 3.
FORMICA HERCULANEA
OR LARGEST ANT

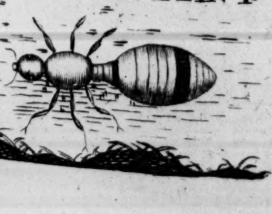
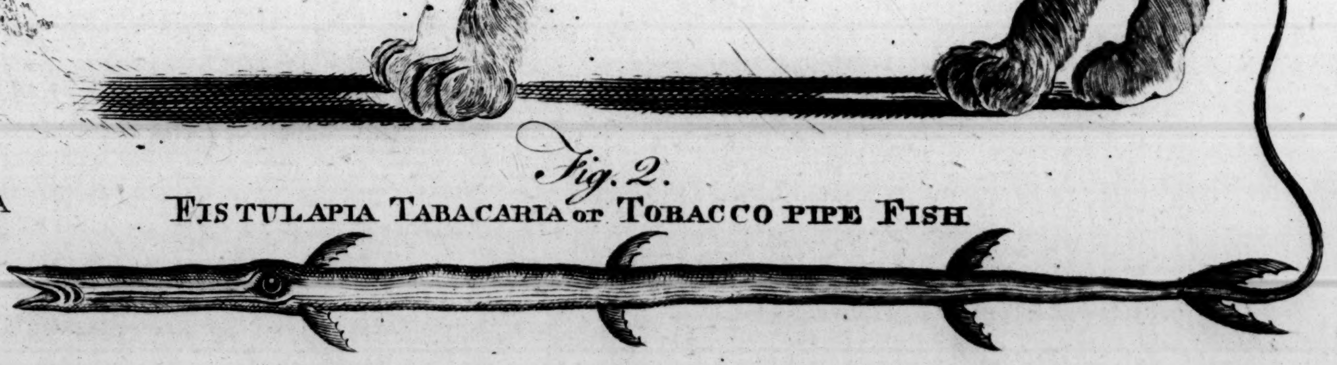


Fig. 2.
FISTULAPIA TABACARIA OR TOBACCO PIPE FISH



A Bell Sculp.

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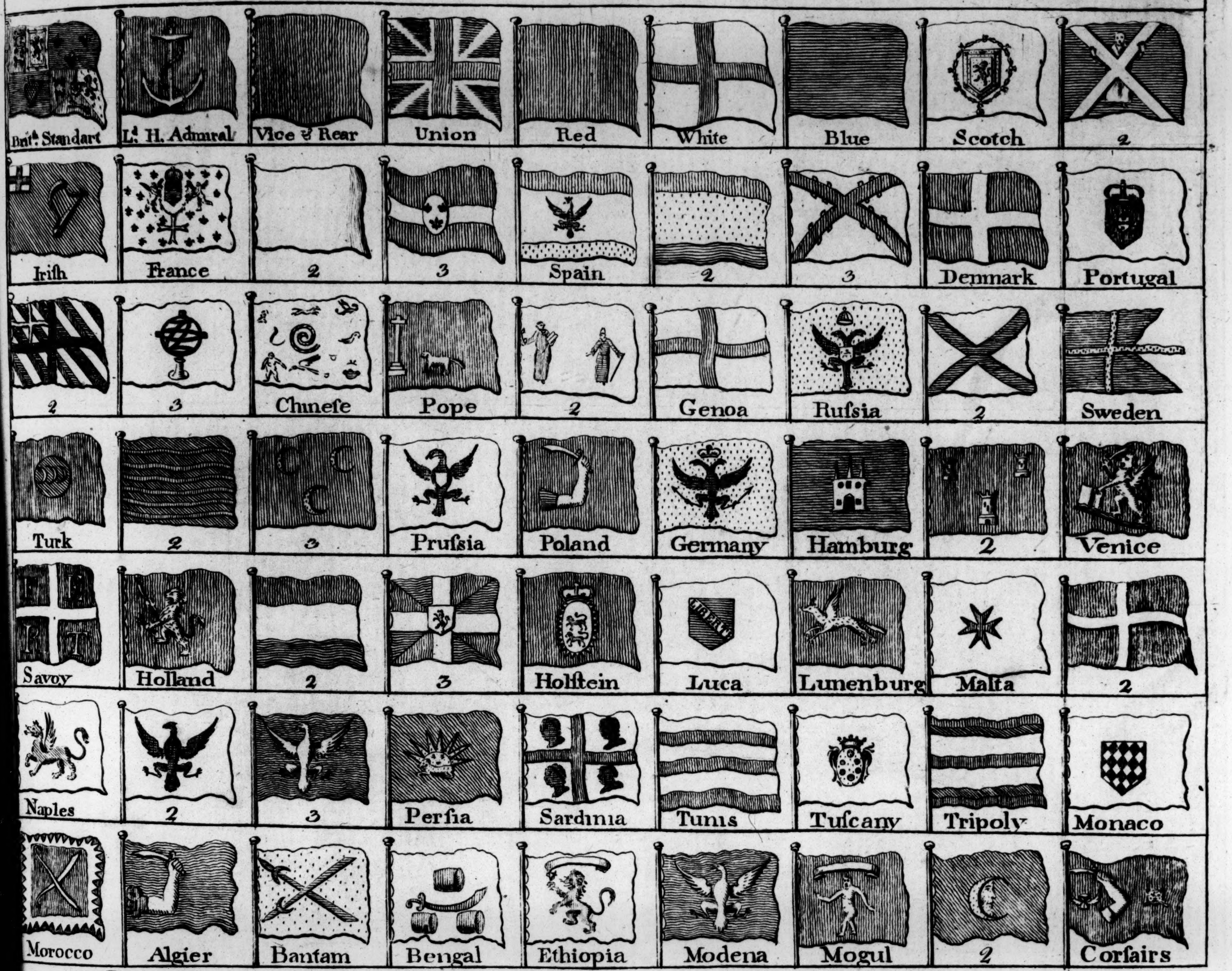
FLAGS

Plate CIX.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Ld. H. Admiral
Vice & Rear
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White
Blue
Scotch
2
Iriſh
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Spain
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Portugal
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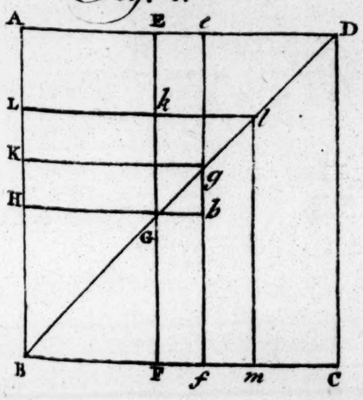
FLUXIONS

Fig. 1.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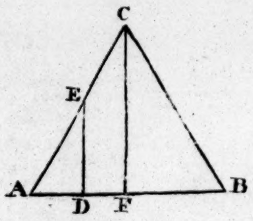

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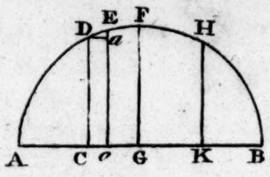
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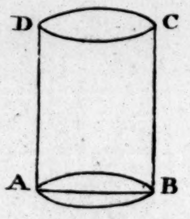

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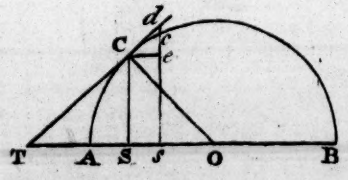
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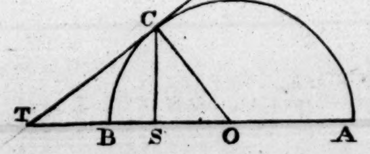

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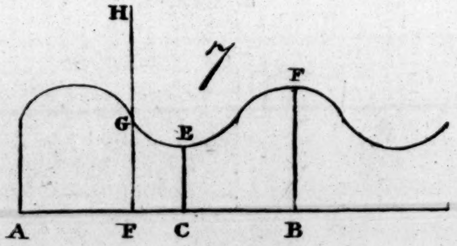

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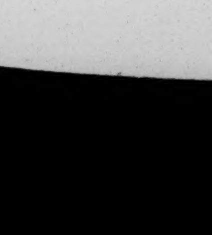

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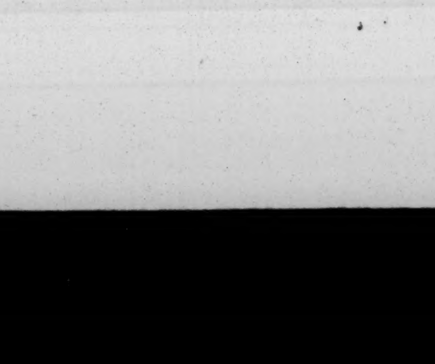
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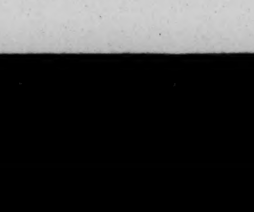

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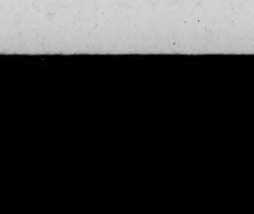
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3 MA 53

the reſpect, or ſubmiſſion, due from all ſhips or fleets inferior to thoſe any way juſtly their ſuperiors. To lower or ſtrike the flag in an engagement is a ſign of yielding.

The way of leading a ſhip in triumph is to tie the flags to the ſhrouds, or the gallery, in the hind-part of the ſhip, and let them hang down towards the water, and to tow the veſſels by the ſtern. Livy relates, that this was the way the Romans uſed thoſe of Carthage.

To Heave out the FLAG, is to put out or put abroad the flag.

To Hang out the White FLAG, is to aſk quarter; or it ſhews, when a veſſel is arrived on a coaſt, that it has no hoſtile intention, but comes to trade, or the like. The red flag is a ſign of defiance, and battle.

Corn-FLAG. See GLADIOLUS.

Sweet-ſcented FLAG. See ACORUS.

FLAG-*Officers*, thoſe who command the ſeveral ſquadrons of a fleet; ſuch are the admirals, vice-admirals, and rear-admirals.

The flag-officers in our pay, are the admiral, vice-admiral, and rear-admiral, of the white, red, and blue. See ADMIRAL, FLAG, and FLEET.

FLAG-*Ship*, a ſhip commanded by a general or flag-officer, who has a right to carry a flag, in contradiſtinction to the ſecondary veſſels under the command thereof.

FLAGELLANTES, a ſect of heretics, who chaſtiſed and diſciplined themſelves with whips, in public.

The ſect of the Flagellantes had its riſe at Peruſa, in the year 1260. Its author was one Rainier, a hermit. It was in all probability no more than the effect of an indiſcreet zeal. A great number of perſons of all ages made proceſſions, walking two by two, with their ſhoulders bare, which they whipped, till the blood ran down, in order to obtain mercy from God, and appeaſe his indignation againſt the wickedneſs of the age. They were then called the *devout:* and having eſtabliſhed a ſuperior, he was called the *general of the devotion.*

Women did not appear in theſe public aſſemblies; though they practiſed the ſame ſeverities; but it was in private, and in their own houſes.

In the middle of the 14th century, the ſect of the Flagellantes was reſtored, on occaſion of a great mortality, and ſpread itſelf into all parts of Europe.

The biſhops and magiſtrates at length found it neceſſary to put a ſtop to their exceſs. The writers and preachers diſputed againſt it; but the Flagellantes remained unſhaken againſt all they could ſay: ſo that of a number of, perhaps, innocent well-meaning zealots, pride, obſtinacy and ſchiſm converted them into a dangerous ſect. They held, that the blood thus ſpilt was mixed with that of Jeſus Chriſt; and that by a flagellation of 24 days they gained the pardon of all their ſins.

Clement VI. forbad all public flagellations. Gerſon wrote an expreſs treatiſe againſt public flagellations.

FLAGEOLET, or FLAJEOLET, a little flute, uſed chiefly by ſhepherds and country-people. It is made of box or other hard wood, and ſometimes of ivory; and has ſix holes beſides that at the bottom, the mouth-piece, and that behind the neck.

FLAIL, an inſtrument for threſhing corn. It conſiſts of the following parts. 1. The hand-ſtaff, or piece held in the threſher's hand. 2. The ſwiple, or that part which ſtrikes out the corn. 3. The caplins, or ſtrong double leathers, made faſt to the tops of the hand-ſtaff and ſwiple. 4. The middle-band, being the leather thong, or fiſh ſkin, that ties the caplins together.

FLAMBEAU, a kind of large taper, made of hempen wicks, by pouring melted wax on their top, and letting it run down to the bottom. This done, they lay them to dry; after which they roll them on a table, and join four of them together by means of a red-hot iron; and then pour on more wax, till the flambeau is brought to the ſize required. Flambeaus are of different lengths, and made either of white or yellow wax. They ſerve to give light in the ſtreets at night, or on occaſion of illuminations.

FLAMBOROUGH-HEAD, in geography, a cape or promontory of Yorkſhire, five miles eaſt of Burlington. E. Long. 20°. N. Lat. 54. 15.

FLAME, is a general name for every kind of luminous vapour, provided the light it emits hath any conſiderable degree of intenſity. The name *flame*, however, is moſt generally applied to ſuch as are of a conical figure, like thoſe ariſing from our common fires; without this, they are commonly called *luminous vapours*, or ſimply *lights*.

According to Sir Iſaac Newton, flame is only *red-hot ſmoke*, or the vapour of any ſubſtance raiſed from it by fire and heated to ſuch a degree as to emit light copiouſly. This definition ſeems to be the moſt accurate and expreſſive of any. It is certain, that bodies are capable of emitting flame only in proportion to the quantity of vapour that riſes from them. Thus wood, coals, &c. which emit a great quantity of vapour, flame violently; while lead, tin, &c. which emit but a ſmall fume, can ſcarce be perceived to flame at all.

This rule, however, is by no means to be depended upon in all caſes. Some vapours *ſeem* to be in their own nature uninflammable, and capable of extinguiſhing flame, as thoſe of water, the mineral acids, ſal-ammoniac, arſenic, &c. while others take fire on the ſlighteſt approach of a flaming ſubſtance, ſuch as ether, ſpirit of wine, &c. Theſe laſt mentioned ſubſtances alſo exhibit a remarkable phenomenon; namely, that they cannot be made to flame without the approach of ſome ſubſtance actually in flames beforehand. Thus, ſpirit of wine, poured on a red-hot iron, though inſtantly diſſipated in vapour, will not flame; but if a burning candle touches its ſurface, the whole is ſet in a flame at once. The caſe is otherwiſe with oils, eſpecially thoſe of the groſſer kind; for their vapours will readily be changed into flame by the mere increaſe of heat, without the approach of any flaming ſubſtance.

There is, however, no kind of vapour, perhaps, that is incapable of being converted into flame, provided it is expoſed to a ſufficient degree of heat. Thus the vapour of water, made to paſs through burning coals, produces an exceedingly ſtrong and bright flame.—It is remarkable, that this kind of vapour ſeems to be more powerful than almoſt any other in abſorbing heat, and detaining it in a latent ſtate. Dr Black hath ſhewn, that when any quantity of aqueous vapour is condenſed, more heat will be ſeparated from it than would have been ſufficient to heat an equal bulk of iron red-hot.—It is moſt probably to this property which all vapours have of abſorbing heat, and detaining it in a latent ſtate, that we are to attribute the phenomena of flame, and alſo the exceeding great elaſticity of ſteam. It is certain, that vapours, of water at leaſt, have a much greater power of abſorbing and retaining heat, than the water from which they are raiſed. In open veſſels, water cannot be heated more than 212 degrees of Fahrenheit's thermometer; but in Papin's digeſter, where the vapour is forcibly confined, it has been heated to 400 of the ſame degrees; and, no doubt, might have been heated a great deal more, had the veſſels been ſtrong enough to bear the expanſile force of the ſteam. On opening the veſſels, however, the exceſs of heat was found to have reſided entirely in the vapour; for the water in the veſſel very ſoon ſunk down to 212°, while the ſteam iſſued forth with great violence.

From theſe experiments it appears, that the ſteam of water, after it has abſorbed as much heat in a latent ſtate as it can contain, continues to abſorb, or detain among its particles, an unlimited quantity of ſenſible heat; and if the ſteam could be confined till this quantity became great enough to be viſible by its emiſſion of light, there cannot be the leaſt doubt that the vapour would then be converted into flame.

In what manner the heat is detained among the particles of ſteam, is perhaps impoſſible to be explained; but to this heat we muſt undoubtedly aſcribe the violent expanſive force of ſteam of every kind. It ſeems probable, that, when ſmoke is converted into flame, the latent heat with which the vapour had combined, or rather that which made an eſſential part of it, breaks forth, and adds to the quantity of ſenſible heat which is already preſent. This ſeems probable, from the ſudden exploſion with which all flames break out. If a veſſel full of oil is ſet over the fire, a ſmoke or vapour begins to ariſe from it; which grows gradually thicker and thicker; and at laſt begins to ſhine in ſome places very near the ſurface of the oil, like an electric light, or ſulphur juſt kindled. At this time the oil is very hot, as well as the ſteam which iſſues from it. But this laſt is continually giving off its ſenſible heat into the atmoſphere; ſo that at the diſtance of an inch or two from the ſurface of the oil, the heat of the ſteam will not exceed 400 degrees of Fahrenheit, or perhaps may not be ſo much; but if a burning candle is held in the ſteam for a moment, the whole is immediately converted into flame, with ſomething like an exploſion; after which, the oil burns quietly until it is all conſumed. The flame, as ſoon as it appears, is not only much hotter than the ſteam from whence it was produced, but even than the oil which lies below it. Whence, then, has this ſudden and great increaſe of heat ariſen? It could not be the *ſenſible* heat of the vapour, for that was greatly inferior; nor could it be communicated from the oil, for that could communicate no more than it had to itſelf. The candle, indeed, would communicate a quantity of heat to the vapour which touched its flame; but it is impoſſible that this quantity ſhould extend permanently over a ſurface perhaps 100 times larger than the flame of the candle, in ſuch a manner as to make every part of that ſurface equally hot with the flame of the candle itſelf; for this would be to ſuppoſe it to communicate 100 times more heat than really was in it. The heat therefore muſt have originally reſided in the vapour itſelf: and as, in the freezing of water, its latent heat is extricated and becomes ſenſible, and the water thereupon loſes its fluidity; ſo, in the accenſion of vapour, the latent heat breaks forth with a bright flaſh, and the vapour is then totally decompoſed, and converted into ſoot, aſhes, or water, according to the different nature of the ſubſtances which produce it, or according to the intenſity of the heat.—Several other hypotheſes have been invented to ſolve the phenomena of burning and flaming bodies; for an account of which, ſee the articles IGNITION, PHLOGISTON, &c.

Flames are of different colours, according to the ſubſtances from which they are produced. Thus, the flame of ſulphur and ſpirit of wine is blue; the flame of nitre and zinc, of a bright white; that of copper, of a greeniſh blue, &c.—Theſe varieties afford an opportunity of making a number of agreeable repreſentations in fire-works, which could not be done if the flame produced from every different ſubſtance was of the ſame colour. See PYROTECHNICS.

FLAMEN, in Roman antiquity, the name of an order of prieſts, inſtituted by Romulus or Numa; authors not being agreed on this head.

They were originally only three, viz. the flamen dialis, flamen martialis, and flamen quirinus. They were choſen by the people, and inſtalled by the ſovereign pontiff. Afterwards, their number was increaſed to 15; the three firſt of whom were ſenators, and called *flamines majores*; the other 12, taken from among the people, being denominated *flamines minores*.

The flamen dialis, or prieſt of Jupiter, was a conſiderable perſon at Rome; the flamen martialis, or prieſt of Mars, was the ſecond in dignity; and the flamen quirinalis, was the next to him.

The greater flamen wore the robe edged with purple, like that of the great magiſtrates, had an ivory chair, and ſat in the ſenate. They wore a little band of thread (*filamen*) about their head; from whence, according to Varro, they had their name. There were likewiſe *flaminicæ*, or prieſteſſes, who were the wives of the *flamines diales*. Theſe wore a flame-coloured habit, on which was painted the image of a thunderbolt; and above their head-dreſs they wore green oak-boughs. They are often mentioned in inſcriptions.

FLAMINGO, in ornithology. See PHOENICOPTERUS.

FLAMINIUS, or FLAMINIO, (Mark Anthony), one of the beſt Latin poets in the 16th century, of Imola in Italy, ſon and grandſon of very learned men. The pope had choſen him ſecretary to the council in 1545; but he refuſed that employment, becauſe, favouring the new opinions, he would not employ his pen in an aſſembly where he knew theſe opinions were to be condemned.—He paraphraſed 30 of the pſalms in Latin verſe, and alſo wrote notes on the pſalms; and ſome letters and poems which are eſteemed. He died at Rome in 1550.

FLAMSTEED (John), an eminent Engliſh aſtronomer in the 13th century, born at Derby in 1646. He had early read a great deal of civil and eccleſiaſtical hiſtory; but happening to ſee John de Sacroboſco's book *de Sphæra*, this gave him a turn for aſtronomy, which ſtudy he afterwards proſecuted with great vigour. His father, finding him in correſpondence with ſeveral learned men, adviſed him to go to London, that he might be perſonally acquainted with them. In 1674, he wrote an ephemeris, in which he ſhewed the falſity of aſtrology; and gave a table of the moon's riſing and ſetting, carefully calculated, together with the eclipſes and appulſes of the moon and planets to fixed ſtars. This fell into the hands of Sir Jonas More; for whom, at his requeſt, he made a table of the moon's true ſouthings. In 1674, Sir Jonas having informed him, that a true account of the tides would be highly acceptable to his majeſty, he compoſed a ſmall ephemeris for the king's uſe: and when Sir Jonas ſhewed the king and duke of York our author's teleſcopes and micrometer, and recommended him ſtrongly, he procured him a warrant to be king's aſtronomer, with the ſalary of L. 100 *per annum*; on which occaſion he was ordained. In 1675, the foundation of the royal obſervatory at Greenwich was laid, and during the building he lodged at Greenwich; his quadrant and teleſcopes being kept in the queen's houſe there.

His *Doctrine of the Sphere* was publiſhed in 1681, in a poſthumous work of Sir Jonas More, intitled, *A new Syſtem of the Mathematics.* In 1684, he was preſented to the living of Burſtow in Surry, which he enjoyed till he died in 1719. His *Hiſtoria cœleſtis Britannica*, was publiſhed at London in 1725, in 3 vols. Mr Flamſteed likewiſe compoſed the Britiſh Catalogue of the fixed ſtars, which contains twice the number that are in the catalogue of Hevelius; to each of which he annexed its longitude, latitude, right aſcenſion, and diſtance from the pole, together with the variation of right aſcenſion and declination, while the longitude increaſes a degree. This catalogue, together with moſt of his obſervations, were printed on a fine paper and character, at the expence of the late prince George of Denmark.

FLANDERS, a province of the Netherlands, bounded by the German ſea and the United Provinces on the north; by the province of Brabant on the eaſt; by Hainault and Artois on the ſouth; and by another part of Artois and the German ſea on the weſt; being about 60 miles long, and 50 broad, and divided between the Auſtrians, the French, and the Dutch.

Flanders is a perfectly champaign country, with not a riſing ground or hill in it, and watered with many fine rivers and canals. Its chief commodities are fine lace, linen, and tapeſtry.

In this country ſome important arts were invented and improved. Weaving in general was greatly improved, and that of figures of all ſorts in linen were invented; alſo the art of dying cloths and ſtuffs, and of oil-colours; the curing of herrings, &c. The manufactures of this country are not now in the flouriſhing ſtate they were formerly; yet, ſilk, cotton, and woollen ſtuffs, brocades, camblets, tapeſtry, lace, and linen, are ſtill manufactured here in great quantities. This province had counts of its own from the ninth century to the year 1369, when it went by marriage to the dukes of Burgundy; and afterwards from them, by marriage alſo, to the houſe of Auſtria. France, in 1667, ſeized the ſouthern part, and the States-General obtained the northern, partly by the treaty of Munſter, and partly by the barrier-treaty of 1715.

FLANEL, or FLANNEL, a looſe ſort of woollen ſtuff, not croſſed, and woven on a loom like bays.

FLATMAN (Thomas), an Engliſh poet of ſome repute, born at London about the year 1633. He ſtudied at the Inner-Temple, and became a barriſter, but it does not appear that he ever practiſed; for having a turn for the fine arts, he gave a looſe to his inclination that way, and acquired reputation both as a poet and a painter. He publiſhed, in 1782, a third edition of his poems and ſongs, dedicated to the duke of Ormond, with a print of himſelf as a frontiſpiece: he alſo publiſhed a ſatirical romance in proſe, on Richard Cromwell, ſoon after the reſtoration; which took greatly at that turn of affairs. He died about 1688.

FLATS, in muſic. See INTERVAL.

FLATUS, FLATULENCE, in medicine; vapours generated in the ſtomach and inteſtines, chiefly occaſioned by a weakneſs of theſe parts. They occaſion diſtenſions, uneaſy ſenſation, and ſickneſs, and often a conſiderable degree of pain. See (the *Index* ſubjoined to) MEDICINE.

FLAVEL (John), an eminent nonconformiſt miniſter, was educated at Univerſity-college, in Oxford; and became miniſter of Deptford, and afterwards of Dartmouth, in Devonſhire, where he reſided the greateſt part of his life, and was admired for his preaching. Though he was generally reſpected at Dartmouth; yet, in 1685, ſeveral of the aldermen of that town, attended by the rabble, carried about a ridiculous effigy of him, to which were affixed the Bill of Excluſion and the Covenant. Upon this occaſion, he thought it prudent to withdraw from the town; not knowing what treatment he might meet with from a riotous mob, headed by magiſtrates who were themſelves among the loweſt of mankind. Part of his Diary, printed with his Remains, muſt give the reader a high idea of his piety. He died in 1691, aged 61; and after his death, his works, which conſiſted of many pieces of practical divinity, were printed in two volumes folio. Among theſe, the moſt famous are his "Navigation ſpiritualized, or a new Compaſs for Seamen, conſiſting of 32 points of pleaſant obſervations and ſerious reflections," of which there have been ſeveral editions in octavo; and his "Huſbandry ſpiritualized, &c. with occaſional meditations upon beaſts, birds, trees, flowers, rivers, and ſeveral other objects," of which alſo there have been many editions in octavo.

FLAX, in botany. See LINUM.

The following particulars with regard to the manner of raiſing flax has been for ſome years paſt warmly recommended by the truſtees for fiſheries, manufactures, and improvements in Scotland.

Of the choice of the Soil, and preparing the Ground, for FLAX. A ſkilful flax-raiſer always prefers a free open deep loam, and all grounds that produced the preceding year a good crop of turnip, cabbage, potatoes, barley, or broad clover; or have been formerly laid down rich, and kept for ſome years in paſture.

A clay ſoil, the ſecond or third crop after being limed, will anſwer well for flax; provided, if the ground be ſtill ſtiff, that it be brought to a proper mould, by tilling after harveſt, to expoſe it to the winter froſts.

All new grounds produce a ſtrong crop of flax, and pretty free of weeds. When a great many mole-heaps appear upon new ground, it anſwers the better for flax after one tilling.

Flax-ſeed ought never to be ſown on grounds that are either too wet or dry; but on ſuch as retain a natural moiſture: and ſuch grounds as are inclined to weeds ought to be avoided, unleſs prepared by a careful ſummer-fallow.

If the lintſeed be ſown early, and the flax not allowed to ſtand for ſeed, a crop of turnip may be got after the flax that very year; the ſecond year a crop of bear or barley may be taken; and the third year, graſs-ſeeds are ſometimes ſown along with the lintſeed. This is the method moſtly practiſed in and about the counties of Lincoln and Somerſet, where great quantities of flax and hemp are every year raiſed, and where theſe crops have long been capital articles. There, old ploughed grounds are never ſown with lintſeed, unleſs the ſoil be very rich and clean. A certain worm, called in Scotland the *coup-worm*, abounds in new-broke up grounds, which greatly hurts every crop but flax. In ſmall incloſures ſurrounded with trees or high hedges, the flax, for want of free-air, is ſubject to fall before it be ripe, and the droppings of rain and dew from the trees prevent the flax within the reach of the trees from growing to any perfection.

Of preceding crops, potatoes and hemp are the beſt preparation for flax. In the fens of Lincoln, upon proper ground of old tillage, they ſow hemp, dunging well the firſt year; the ſecond year, hemp without dung; the third year, flax without dung; and that ſame year, a crop of turnip eat on the ground by ſheep; the fourth year, hemp with a large coat of dung; and ſo on for ever.

If the ground be free and open, it ſhould be but once ploughed; and that as ſhallow as poſſible, not deeper than 2½ inches. It ſhould be laid flat, reduced to a fine garden-mould by much harrowing, and all ſtones and ſods ſhould be carried off.

Except a little pigeon's dung for cold or four ground, no other dung ſhould be uſed preparatory for flax; becauſe it produces too many weeds, and throws up the flax thin and poor upon the ſtalk.

Before ſowing, the bulky clods ſhould be broken, or carried off the ground; and ſtones, quickenings, and every other thing that may hinder the growth of the flax, ſhould be removed.

Of the choice of Lintſeed. The brighter in colour, and heavier the ſeed is, ſo much the better; that which when bruiſed appears of a light or yellowiſh green, and freſh in the heart, oily and not dry, and ſmells and taſtes ſweet, and not fuſty, may be depended upon.

Dutch ſeed of the preceding year's growth, for the moſt part, anſwers beſt; but it ſeldom ſucceeds if kept another year. It ripens ſooner than any other foreign ſeed. Philadelphia-ſeed produces fine lint and few bolls, becauſe ſown thick, and anſwers beſt in wet cold ſoils. Riga-ſeed produces coarſer lint, and the greateſt quantity of ſeed. Scots-ſeed, when well winned and kept, and changed from one kind of ſoil to another, ſometimes anſwers pretty well; but ſhould be ſown thick, as many of its grains are bad, and fail. It ſprings well, and its flax is ſooner ripe than any other; but its produce afterwards is generally inferior to that from foreign ſeed.

A kind has been lately imported, called *memmel-ſeed;* which looks well, is ſhort and plump, but ſeldom grows above eight inches, and on that account ought not to be ſown.

Of Sowing Lintſeed. The quantity of lintſeed ſown, ſhould be proportioned to the condition of the ſoil; for if the ground be in good heart, and the ſeed ſown thick, the crop will be in danger of falling before it is ready for pulling. From 11 to 12 pecks Linlithgow meaſure of Dutch or Riga ſeed, is generally ſufficient for one Scots acre; and about ten pecks of Philadelphia ſeed, which, being the ſmalleſt grained, goes fartheſt. Riga lintſeed, and the next year's produce of it, is preferred in Lincolnſhire.

The time for ſowing lintſeed is from the middle of March to the end of April, as the ground and ſeaſon anſwers; but the earlier the ſeed is ſown, the leſs the crop interferes with the corn-harveſt.

Late ſown lintſeed may grow long, but the flax upon the ſtalk will be thin and poor.

After ſowing, the ground ought to be harrowed till the ſeed is well covered, and then (ſuppoſing the ſoil, as before mentioned, to be free and reduced to a fine mould) it ought to be rolled.

When a farmer ſows a large quantity of lintſeed, he may find it proper to ſow a part earlier and part latter, that in the future operations of weeding, pulling, watering, and graſſing, the work may be the eaſier and more conveniently gone about.

It ought always to be ſown on a dry bed.

Of Weeding FLAX. It ought to be weeded when the crop is about four inches long. If longer deferred, the weeders will ſo much break and crook the ſtalks, that they will never perhaps recover their ſtraightneſs again; and when the flax grows crooked, it is more liable to be hurt in the rippling and ſwingling.

Quicken-graſs ſhould not be taken up; for, being ſtrongly rooted, the pulling of it always looſens a deal of the lint.

If there is an appearance of a ſettled drought, it is better to defer the weeding, than by that operation to expoſe the tender roots of the flax to the drought.

How ſoon the weeds are got out, they ought to be carried off the field, inſtead of being laid in the furrows, where they often take root again, and at any rate obſtruct the growth of the flax in the furrows.

Of Pulling FLAX. When the crop grows ſo ſhort and branchy, as to appear more valuable for ſeed than flax, it ought not to be pulled before it be throughly ripe; but if it grows long and not branchy, the ſeed ſhould be diſregarded, and all the attention given to the flax. In the laſt caſe it ought to be pulled after the bloom has fallen, when the ſtalk begins to turn yellow, and before the leaves fall, and the bolls turn hard and ſharp-pointed.

When the ſtalk is ſmall, and carries few bolls, the flax is fine; but the ſtalk of coarſe flax is groſs, rank, branchy, and carries many bolls.

When the flax has fallen, and lies; ſuch as lies ought to be immediately pulled, whether it has grown enough or not, as otherwiſe it will rot altogether.

When parts of the ſame field grow unequally, ſo that ſome parts are ready for pulling before other parts; only what is ready ſhould be pulled, and the reſt ſhould be ſuffered to ſtand till ready.

The flax-raiſer ought to be at pains to pull, and keep by itſelf, each different kind of lint which he finds in his field; what is both long and fine, by itſelf; what is both long and courſe, by itſelf; what is both ſhort and fine, by itſelf; what is both ſhort and coarſe, by itſelf; and in like manner every other kind by itſelf that is of the ſame ſize and quality. If the different kinds be not thus kept ſeparate, the flax muſt be much damaged in the watering and the other ſucceeding operations.

What is commonly called under-growth may be neglected as uſeleſs.

Few perſons that have ſeen pulled flax, are ignorant of the method of laying it in handfuls acroſs each other; which gives the flax ſufficient air, and keeps the handfuls ſeparate and ready for the rippler.

Of Stacking up Flax *during the Winter, and Winning the Seed.* If the flax be more valuable than the ſeed, it ought by no means to be ſtacked up; for its own natural juice aſſiſts it greatly in the watering; whereas, if kept long unwatered, it loſes that juice, and the harle adheres ſo much to the boon, that it requires longer time to water, and even the quality of the flax becomes thereby harſher and coarſer. Beſides, the flax ſtacked up over year, is in great danger from vermin and other accidents; the water in ſpring is not ſo ſoft and warm as in harveſt; and near a year is thereby loſt of the uſe of the lint: but if the flax be ſo ſhort and branchy as to appear moſt valuable for ſeed, it ought, after pulling, to be ſtooked and dried upon the field, as is done with corn; then ſtacked up for winter, rippled in ſpring; and after ſheeling, the ſeed ſhould be well cleaned from bad ſeeds, &c.

Of Rippling Flax. After pulling, if the flax is to be regarded more than the ſeed, it ſhould be allowed to lie ſome hours upon the ground to dry a little, and ſo gain ſome firmneſs, to prevent the ſkin or harle, which is the flax, from rubbing off in the rippling; an operation which ought by no means to be neglected, as the bolls, if put into the water along with the flax, breed vermin there, and otherwiſe ſpoil the water. The bolls alſo prove very inconvenient in the graſſing and breaking.

In Lincolnſhire and Ireland, they think that rippling hurts the flax; and therefore, in place of rippling, they ſtrike the bolls againſt a ſtone.

The handfuls for rippling ſhould not be great, as that endangers the lint in the rippling comb.

After rippling, the flax-raiſer will perceive, that he is able to aſſort each ſize and quality of the flax by itſelf more exactly than he could before.

Of Watering Flax. A running ſtream waſtes the lint, makes it white, and frequently carries it away. Lochs, by the great quantity and motion of the water, alſo waſte and whiten the flax, tho' not ſo much as running ſtreams. Both rivers and lochs water the flax quicker than canals.

But all flax ought to be watered in canals, which ſhould be digged in clay ground if poſſible, as that ſoil retains the water beſt: but if a firm retentive ſoil cannot be got, the bottom or ſides of the canal, or both the bottom and ſides, may be lined with clay; or, inſtead of lining the ſides with clay, which might fall down, a ditch may be dug without the canal, and filled with clay, which will prevent both extraneous water from entering, and the water within from running off.

A canal of 40 feet long, ſix broad, and four deep, will generally water the growth of an acre of flax.

It ought to be filled with freſh ſoft water from a river or brook, if poſſible two or three weeks before the flax is put in, and expoſed all that time to the heat of the ſun. The greater way the river or brook has run, the ſofter, and therefore the better, will the water be. Springs, or ſhort-runs from hills, are too cold, unleſs the water is allowed to ſtand long in the canal. Water from coal or iron, is very bad for flax. A little of the powder of galls thrown into a glaſs of water, will immediately diſcover if it comes from minerals of that kind, by turning it into a dark colour, more or leſs tinged in proportion to the quantity of vitriol it contains.

The canal ought not to be under ſhade; which, beſides keeping the ſun from ſoftening the water, might make part of the canal cooler than other parts, and ſo water the flax unequally.

The flax-raiſer will obſerve, when the water is brought to a proper heat, that ſmall plants will be riſing quickly in it, numbers of ſmall inſects and reptiles will be generating there, and bubbles of air riſing on the ſurface. If no ſuch ſigns appear, the water muſt not be warm enough, or is otherwiſe unfit for flax.

Moſs-holes, when neither too deep nor too ſhallow, frequently anſwer well for watering flax, when the water is proper, as before deſcribed.

The proper ſeaſon for watering flax is, from the end of July to the end of Auguſt.

The advantage of watering flax as ſoon as poſſible after pulling, has been already mentioned.

The flax being ſorted after rippling, as before-mentioned, ſhould next be put in beets, never larger than a man can graſp with both his hands, and tied very ſlack, with a band of a few ſtalks. Dried ruſhes anſwer exceedingly well for binding flax, as they do not rot in the water, and may be dried and kept for uſe again.

The beets ſhould be put into the canals ſlope-ways, or half ſtanding upon end, the root-end uppermoſt. Upon the crop-ends, when uppermoſt, there frequently breeds a deal of vermin, deſtructive of the flax, which is effectually prevented by putting the crop-end downmoſt.

The whole flax in the canal ought to be carefully covered from the ſun with divots; the graſſy ſide of which ſhould be next the flax, to keep it clean. If it is not thus covered, the ſun will diſcolour the flax, tho' quite covered with water. If the divots are not weighty enough to keep the flax entirely under water, a few ſtones may be laid above them. But the flax ſhould not be preſſed to the bottom.

When the flax is ſufficiently watered, it feels ſoft to the grip, and the *harle* parts eaſily with the *boon* or *ſhow*, which laſt is then become brittle, and looks whitiſh. When theſe ſigns are found, the flax ſhould be taken out of the water, beet after beet; each gently rinſed in the water, to cleanſe it of the naſtineſs which has gathered about it in the canal; and as the lint is then very tender, and the beet ſlackly tied, it muſt be carefully and gently handled,

Great care ought to be taken that no part be overdone; and as the coarſeſt waters ſooneſt, if different kinds be mixed together, a part will be rotted, when the reſt is not ſufficiently watered.

When lint taken out of the canal is not found ſufficiently watered, it may be laid in a heap, for 12, 18, or 24 hours, which will have an effect like more watering; but this operation is nice, and may prove dangerous in unſkilful hands.

After the flax is taken out of the canal, freſh lint ſhould not be put a ſecond time into it, until the former water be run off, and the canal cleaned, and ſupplied with freſh water.

Of Graſſing Flax. Short heath is the beſt field for graſſing flax; as, when wet, it faſtens to the heath, and is thereby prevented from being blown away by the wind. The heath alſo keeps it a little above the earth, and ſo expoſes it the more equally to the weather. When ſuch heath is not to be got, links, or clean old lea-ground is the next beſt. Long-graſs grounds ſhould be avoided, as the graſs growing thro' the lint frequently ſpots, tenders, or rots it; and grounds expoſed to violent winds ſhould alſo be avoided.

The flax, when taken out of the water, muſt be ſpread very thin upon the ground; and being then very tender, it muſt be gently handled. The thinner it is ſpread the better, as it is then the more equally expoſed to the weather. But it ought never to be ſpread during a heavy ſhower, as that would waſh and waſte the harle too much, which is then exceſſively tender, but ſoon after becomes firm enough to bear the rains, which, with the open air and ſunſhine, cleans, ſoftens, and purifies the harle to the degree wanted, and makes it bliſter from the boon. In ſhort, after the flax has got a little firmneſs by being a few hours ſpread in dry weather, the more rain and ſunſhine it gets the better.

If there be little danger of high winds carrying off the flax, it will be much the better of being turned about once a-week. If it is not to be turned, it ought to be very thin ſpread. The ſpreading of flax and hemp, requires a deal of ground, and enriches it greatly.

The ſkilful flax-raiſer ſpreads his firſt row of flax at the end of the field oppoſite to the point from whence the moſt violent wind commonly comes, placing the root-ends foremoſt; he makes the root-ends of every other row overlap the crop-ends of the former row three or four inches, and binds down the laſt row with a rope; by which means the wind does not eaſily get below the lint to blow it away: and as the crop-ends are ſeldom ſo fully watered as the root-ends, the aforeſaid overlapping has an effect like giving the crop-ends more watering. Experience only can fully teach a perſon the ſigns of flax being ſufficiently graſſed: then it is of a clearer colour than formerly; the harle is bliſtered up, and eaſily parts with the boon, which is then become very brittle. The whole ſhould be ſufficiently graſſed before any of it is lifted; for if a part be lifted ſooner than the reſt, that which remains is in great danger from the winds.

A dry day ought to be choſen for taking up the flax; and if there is no appearance of high wind, it ſhould be looſed from the heath or graſs, and left looſe for ſome hours, to make it thoroughly dry.

As a great quantity of flax can ſcarcely be all equally watered and graſſed, and as the different qualities will beſt appear at lifting the flax off the graſs; therefore at that time each different kind ſhould be gathered together, and kept by itſelf; that is, all of the ſame colour, length, and quality

The ſmaller the beets lint is made up in the better for drying, and the more convenient for ſtacking, houſing, &c. and in making up theſe beets, as in every other operation upon flax, it is of great conſequence that the lint be laid together as it grew, the root-ends together, and the crop-ends together.

Follows an Eſtimate of the Expence, Produce, and Profit of a Scots Acre of Flax,—*ſuppoſing the ſeaſon favourable, that no accidental loſſes happen, and that the farmer is neither unſkilful nor negligent.*

	A medium crop.	*A great crop.*	*An extra. crop.*
Ground-rent, labouring the ground, and leading the flax	L. 2 10 0	L. 3 10 0	L. 5 0 0
Lintſeed from L. 2 to L. 4 *per* hogſhead, the medium 3 s. 4 d. *per* peck — — —	1 16 8 for 11 pecks.	1 10 0 for 9 pecks.	1 6 8 for 8 pecks.
Clodding and ſowing — — —	0 2 0	0 2 0	0 2 0
Weeding — — — — —	0 12 0	0 8 0	nothing.
Pulling, ripling, putting in, and covering in the water	0 14 0	0 15 0	1 0 0
Taking out of the water, graſſing, and ſtacking	0 8 0	0 12 0	0 18 0
Breaking and ſcutching, at 2 s. *per* ſtone —	3 0 0 for 30 ſtones.	4 0 0 for 40 ſtones.	6 0 0 for 60 ſtones.
Total expence	L. 9 2 8	L. 10 17 0	L. 14 6 8
Produce at 10 s. *per* ſtone — — —	L 15 0 0 for 30 ſtones.	L. 20 0 0 for 40 ſtones.	L. 30 0 0 for 60 ſtones.
Lintſeed ſold for oil at 1 s. *per* peck — —	0 16 0	0 18 0	1 0 0
The chaff of the bolls is well worth the expence of drying the ſeed; as it is good food, when boiled and mixed with beer, for horſes.			
Total produce	L. 15 16 0	L. 20 18 0	L. 31 0 0
Balance for profit — — —	L. 6 14 4	L 10 1 0	L 16 13 4

There is nothing ſtated here as expence of the canal in which the flax is watered; becauſe that varies much according to the conveniencies people have for making it; and a canal once made requires for after-years only to be repaired and cleanſed.

It is a certain fact, that the greater the crop is, the better is the quality of the ſame kind of flax.

The advantage of having both a crop of flax and a crop of turnip the ſame year—or of ſowing graſs-ſeeds along with the lintſeed—and of reducing the ground to a fine garden mould, free of weeds, ought to be attended to.

For Cambrick and fine Lawn. The ground muſt be a rich light ſoil, rather ſandy, but cannot be too rich.

It ought to be ploughed in September, or the beginning of October, firſt putting a little hot rotten dung upon it. In January it ought to have a ſecond ploughing, after a hard froſt; and when you intend to ſow it, plough it a third time, or rather hoe it, reducing the clods very fine; but make no furrows: the land muſt be made level like a garden; but never work the land when wet.

The ſeed ſhould be ſown the beginning of April, and about double the quantity that is generally ſown by our farmers; if the land be very rich, it will require rather more than double.

As ſoon as ſown (if the weather be dry) it will be neceſſary to roll the ground.

The lint muſt be weeded very clean when about three inches high; directly after which you muſt ſet forked ſticks, of about one-and-half inch thick (which ought to be prepared before) every four or five feet, according to the length of the poles you are to lay upon them; they ſhould be well fixed in the ground, the forked part to receive the poles about ſix or ſeven inches above the lint; each row of poles ſhould be two, three, or four feet aſunder, according to the length of the bruſhwood you are to lay upon them.

The poles ought to be from 10 to 15 feet long, and ſtrong enough to ſupport the bruſh acroſs the poles; take the longeſt bruſhwood you can get, the more branchy the better, very thick, filling up the vacancies with ſmaller bruſh, and any of the branches that riſe higher than 18 or 20 inches ought to be lopt off to make the bruſh lie as level as poſſible: any ſort of bruſh will do except oak, as that tinges the lint.

Your lint muſt be pulled as ſoon as the ſeed is fully formed, which is a few days after it is out of the bloom before the lint turn yellow.

It muſt be pulled above the bruſhwood, and every handful laid upon it as ſoon as poſſible: if it is fine weather, leave it four or five hours in that manner; then carry it to a ſcreen near a barn, to put it under cover in caſe of rain; there it muſt be ſpread four or five days, and always put in the barn at night, or when it appears to rain: the bundles muſt be opened in the barn, or made hollow, to prevent it from heating.

Theſe operations muſt be performed until the lint is perfectly dry, and out of danger of heating; taking care all the time to keep the roots as even as poſſible, and if poſſible keep it from rain or wet: if you cannot prevent it from being wet, it will be better to leave it on the graſs till dry; becauſe when once wet, the putting it under cover before dry, will make it turn black; a thing which muſt be prevented at all events.

If any of the lint upon the border, or through the piece of ground, be coarſer than another, it muſt be ſeparated from the reſt.

The utmoſt care muſt be taken to preſerve the lint entire, or unbroken; for this reaſon they beat off the ſeed with a round mell or bittle.

The moſt proper ground is ſummer-fallow, or after potatoes, or lea; if poſſible near a wood, to prevent the expence of carrying bruſh.

As ſoon as the ſeed is off, if you intend to water it that ſeaſon, it muſt be tied in bundles about as large as you can graſp with your two hands.

The water proper for it, is a very ſmall rivulet or ſoft ſpring free of any metallic ore; taking care that no flood or foul water enters your pit; which muſt be at leaſt five feet deep, about nine or ten broad at the top, and ſeven or eight at the bottom, the length will depend on the quantity of flax you have to water. A very ſmall ſtripe of water, when clear, ſhould always be running in and off from your pit when the lint is in it.

The pit ought to be made three or four months before it be uſed.

You muſt drive poles about four inches thick, with a hook inclining downwards, in this form 7, all along the ſides of the pit, about five feet aſunder. The hooks muſt be level with, or rather under, the ſurface of the water. A long pole, the whole length of the pit, muſt be fixed into theſe hooks on each ſide; and croſs poles put under that, to keep the lint under water; but, the croſs poles are not uſed till the lint is put in. You muſt order it ſo, that all the lint ſhould be three or four inches under water. You next bring your lint to the ſides of the pit; then put your ſheaves head to head, cauſing each to overlap the other about one third, and take as many of theſe as make a bundle of two or two-and-a-half feet broad, laying the one above the other, till it is about four or four-and-a-half feet high; then you tie them together in the middle, and at each root-end: after this, you wrap your bundle in ſtraw, and lay it in the water, putting the thin or broad ſide undermoſt, taking care that none of your lint touch the earth; after it is fully preſſed under water, put in your croſs poles to keep it under. The bundles ought to lie in the pit a foot ſeparate from each other. This renders it eaſy to take out; for, if the bundles entangle, they will be too heavy to raiſe.

The time of watering depends ſo much upon the weather, and ſoftneſs or hardneſs of the water, that it is impoſſible to fix any certain time. This muſt be left to the ſkill of the farmer. If the flax be intended for ſpinning yarn ſoft and fit for cambrick, it ought to be ſpread upon ſhort graſs for four or five days before you put it into the water; but if for lawns, lace, or thread, it is beſt to dry it outright. In either caſe, avoid as much as poſſible to let it get rain; as much rain blanches and waſhes out the oil, which is neceſſary to preſerve the ſtrength.

The great property of this flax is to be fine and long. Thick ſowing raiſes all plants fine and ſlender; and when the ground is very rich, it forces them to a great length. Pulling green prevents that coarſe hardneſs which flax has when let ſtand till it be full ripe, and gives it the fine ſilky property. The bruſhwood, when the flax ſprings up, catches it by the middle,

dle, prevents it from lying down and rotting; infallible conſequences of ſowing thick upon rich ground. It likewiſe keeps it ſtraight, moiſt, and ſoft at the roots; and by keeping it warm, and ſhaded from the ſun, greatly promotes its length. The keeping it from rain, heating, taking proper care of your water, preſerves the colour, and prevents thoſe bars in cloth ſo much complained of by bleachers.

FLAX-DRESSING. For many ages it was the practice to ſeparate the boon or core from the flax, which is the bark of the plant, by the following ſimple *hand methods*. Firſt, for breaking the boon, the ſtalks in ſmall parcels were beat with a mallet; or, more dexterouſly, the *break* (Plate CX. fig. 1. and 2.) was uſed thus: The flax being held in the left-hand a-croſs the three *under-teeth* or *ſwords* of the break (A, fig. 1. and *a*, fig. 2.), the *upper-teeth* (B, fig. 1. and *b*, fig. 2.) were with the right-hand quickly and often forced down upon the flax, which was artfully ſhifted and turned with the left-hand. Next, for clearing the flax of the broken boon: the workman with his left-hand held the flax over the *ſtock* (fig. 3. and 4.) while with his right-hand he ſtruck or threſhed the flax with the *ſcutcher* (fig. 5.).

Theſe methods of breaking and ſcutching the flax being ſlow and very laborious, a *water-mill* was invented in Scotland about 40 years ago; which, with ſome late improvements, makes great diſpatch, and in ſkilful and careful hands gives ſatisfaction. It has been generally conſtructed to break the boon by three dented rollers, placed one above the other. The middle one of which, being forced quickly round, takes the other two along with it, and one end of the handfuls of the flax being by the workman directed in between the upper and middle rollers, the flax is immediately drawn in by the rollers; a curved board or plate of tin behind the rollers directs the flax to return again between the middle and undermoſt rollers;—and thus the operation is repeated until the boon be ſufficiently broke. Great weights of timber or ſtone at the ends of levers, preſs the upper and under rollers towards the middle one.

The ſcutching is next carried on by the mill in the following manner: Four arms, ſomething like the hand-ſcutchers before deſcribed, project from a perpendicular axle; a box around the axle incloſes theſe projecting ſcutchers; and this box is divided among the workmen, each having ſufficient room to ſtand and handle his flax, which, through ſlits in the upper part and ſides of the box, they hold in to the ſtroke of the ſcutchers; which, moving round horizontally, ſtrike the flax a-croſs or at right angles, and ſo threſh out or clear it of the boon.

The breaking of the flax by *rollers* is ſcarcely ſubject to any objection, but that it is dangerous to workmen not ſufficiently on their guard, who ſometimes allow the rollers to take hold of their fingers, and thereby their whole arm is inſtantly drawn in: thus many have loſt their arms. To avoid this danger, a break upon the general principles of the hand-break before deſcribed, has been lately adapted to water-machinery, and uſed in place of rollers. The horizontal ſtroke of the ſcutchers was long thought too ſevere, and waſteful of the flax; but very careful experiments have diſcovered that the waſte complained of muſt be charged to the unſkilfulneſs or negligence of the workmen, as in good hands the mill carries away nothing but what, if not ſo ſcutched off, muſt be taken off in the heckling with more loſs both of time and flax. But to obviate this objection of the violence of the *horizontal ſcutchers*, an imitation of hand-ſcutching has lately been applied to water. The ſcutchers then project from an horizontal axle, and move like the arms of a check-reel, ſtriking the flax neither acroſs nor perpendicularly down, but ſloping in upon the parcel exactly as the flax is ſtruck by the hand-ſcutcher. This ſloping ſtroke is got by raiſing the ſcutching-ſtock ſome inches higher than the centre of the axle; and by raiſing or lowering the ſtock, over which the flax is held, or ſcrewing it nearer to or farther from the ſcutchers, the workman can temper or humour the ſtroke almoſt as he pleaſes.

A lint-mill with horizontal ſcutchers upon a perpendicular axle, requires a houſe of two ſtories, the rollers or break being placed in the ground ſtory, and the ſcutchers in the loft above; but a mill with vertical ſcutchers on an horizontal axle, requires but one ground ſtory for all the machinery.

Another method of breaking and ſcutching flax, more expeditious than the old hand-methods, and more gentle than water-mills, has alſo been lately invented in Scotland. It is much like the break and ſcutcher giving the ſloping ſtroke laſt deſcribed, moved by the foot. The treddle is remarkably long, and the ſcutchers are fixed upon the rim of a fly-wheel. The foot-break is alſo aſſiſted in its motion by a fly. Theſe foot-machines are very uſeful where there are no water-mills, but they are far inferior to the mills in point of expedition.

The next operation that flax undergoes after ſcutching is heckling. The *heckle* (fig. 6.) is firmly fixed to a bench before the workman, who ſtrikes the flax upon the teeth of the heckle, and draws it through the teeth. To perſons unacquainted with that kind of work this may ſeem a very ſimple operation; but, in fact, it requires as much practice to acquire the ſlight of heckling well, and without waſting the flax, as any other operation in the whole manufacture of linen. They uſe coarſer and wider teethed heckles, or finer, according to the quality of the flax; generally putting the flax thro' two heckles, a coarſer one firſt, and next a fine one.

Flax for cambrick and fine lawn, thread, and lace, is dreſſed in a manner ſomewhat different. It is not ſkutched ſo thoroughly as common flax; which from the ſkutch proceeds to the heckle, and from that to the ſpinner: whereas, this fine flax, after a rough ſkutching, is ſcraped and cleanſed with a blunt knife upon the workman's knee covered with his leather-apron; from the knife it proceeds to the ſpinner, who, with a bruſh made for the purpoſe, ſtraights and dreſſes each parcel juſt before ſhe begins to ſpin it.

FLAX *made to reſemble Cotton*. In the Swediſh tranſactions for the year 1747, a method is given of preparing flax in ſuch a manner as to reſemble cotton in whiteneſs and ſoftneſs, as well as in cohererce. For this purpoſe, a little ſea-water is to be put into an iron pot or an untinned copper-kettle, and a mixture of equal parts of birch-aſhes and quicklime ſtrewed upon it: A ſmall bundle of flax is to be opened and

Plate CX.

Fig. 1. Flax hand break

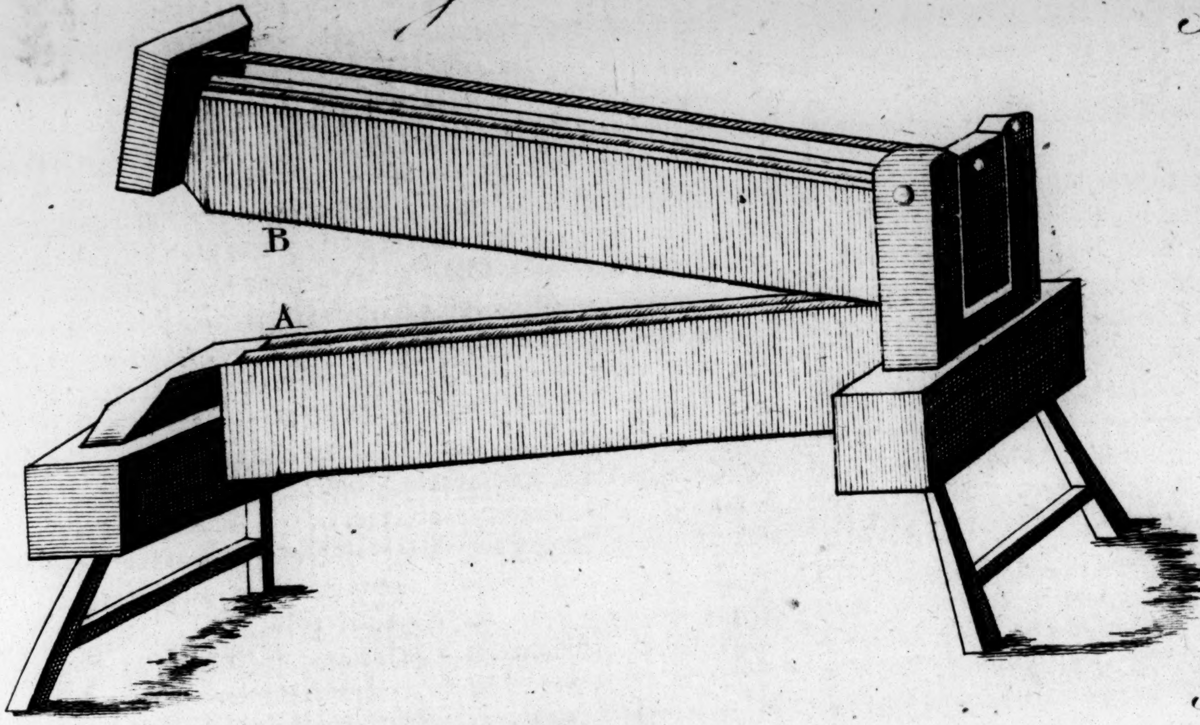


Fig. 2.
Section of the Break

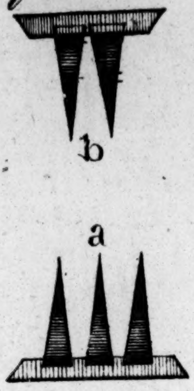
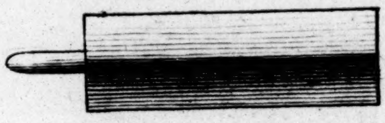


Fig. 5.
Hand Skutcher



Skutching Stock

Fig. 3.
Side view

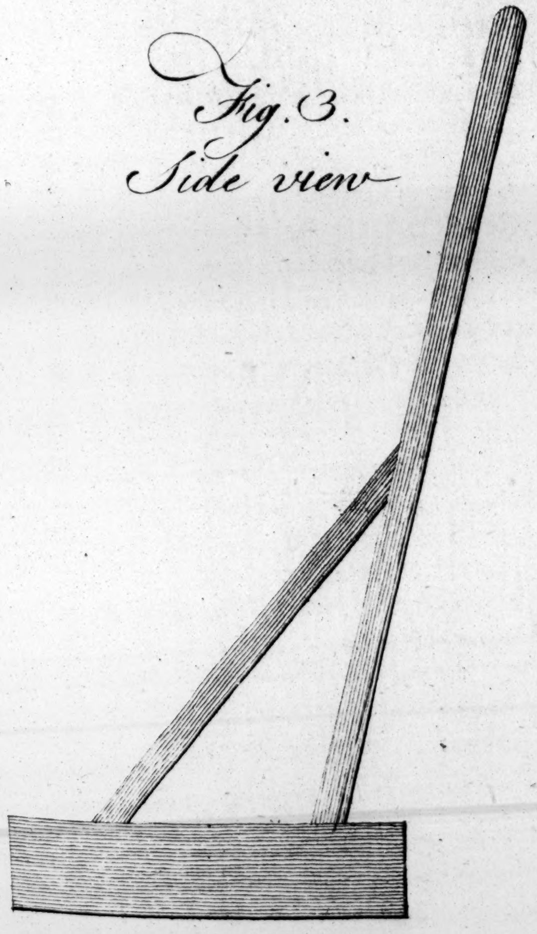


Fig. 4.
Front view

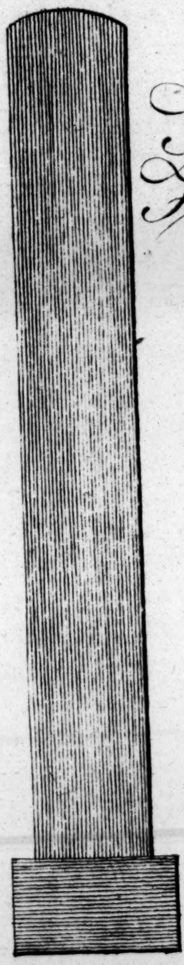


Fig. 6.
Heckle

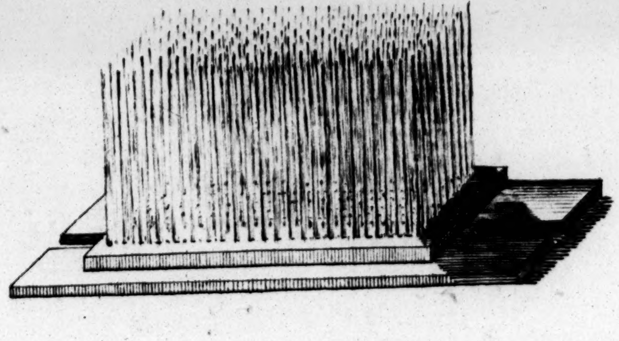
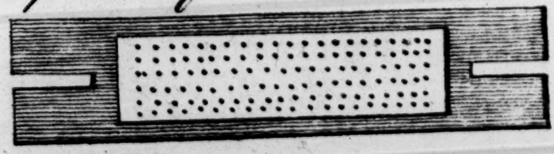


Fig. 7.
plan of the Heckle



A. Bell Sc.t

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and ſpread upon the ſurface, and covered with more of the mixture, and the ſtratification continued till the veſſel is ſufficiently filled. The whole is then to be boiled with ſea-water for ten hours, freſh quantities of water being occaſionally ſupplied in proportion to the evaporation, that the matter may never become dry. The boiled flax is to be immediately waſhed in the ſea by a little at a time, in a baſket, with a ſmooth ſtick: When grown cold enough to be borne by the hands, it muſt be well rubbed, waſhed with ſoap, laid to bleach, and turned and watered every day. Repetitions of the waſhing with ſoap expedite the bleaching; after which the flax is to be beat in again well waſhed; when dry, it is to be worked and carded in the ſame manner as common cotton, and preſſed betwixt two boards for 48 hours. It is now fully prepared and fit for uſe. It loſes in this proceſs near one half its weight, which is abundantly compenſated by the improvement made in its quality.

Earth-Flax. See Amianthus.

New-Zealand Flax-*Plant*. See Phormium.

Toad-Flax. See Linaria.

FLEA, in zoology. See Pulex.

Flea-*Bane*, in botany. See Conyza.

Flea-*Bitten*, that colour of a horſe, which is white or grey, ſpotted all over with dark reddiſh ſpots.

FLEAM, in ſurgery and farriery, an inſtrument for letting blood of a man or horſe. A caſe of fleams, as it is called by farriers, comprehends ſix ſorts of inſtruments; two hooked ones, called *drawers*, and uſed for cleaning wounds; a pen-knife; a ſharp-pointed lancet, for making inciſions; and two fleams, one ſharp and the other broad pointed. Theſe laſt are ſomewhat like the point of a lancet, fixed in a flat handle, and no longer than is juſt neceſſary to open the vein.

FLECHIER (Eſprit), biſhop of Niſmes, one of the moſt celebrated preachers of his age, and the publiſher of many panegyrics and funeral orations, was born at Perne in Avignon, in 1632. He was nominated to the biſhoprick of Lavaur in 1685, and tranſlated to Niſmes in 1687. At this latter place he founded an academy, and took the preſidentſhip upon himſelf: his own palace was indeed a kind of academy, where he applied himſelf to train up orators and writers, who might ſerve the church, and do honour to the nation. He publiſhed, beſides his panegyrics and funeral orations, 1. An hiſtory of the emperor Theodoſius, that of cardinal Ximenes, and that of cardinal Commendon. 2. Several ſermons. 3. Miſcellaneous works. 4. Letters, &c. He died in 1710.

FLECKNOE (Richard), an Engliſh poet in the reign of Charles II. more remarkable for Mr Dryden's ſatire on him, than for any works of his own. He is ſaid to have been originally a jeſuit, and to have had good Engliſh connexions in the Catholic intereſt. When Dryden loſt the place of poet-laureat on the revolution, its being conferred on Flecknoe, for whom he had a ſettled averſion, gave occaſion to his poem intitled *Mac Flecknoe*, one of the beſt-written ſatires in our language, and from which Pope ſeems to have taken the hint for his Dunciad. Flecknoe wrote ſome plays; but could never get more than one of them acted, and that was damned.

FLEECE, the covering of wool ſhorn off the bodies of ſheep. See Wool.

Golden Fleece. See Golden *Fleece*.

FLEET, commonly implies a company of ſhips of war, belonging to any prince or ſtate: but ſometimes it denotes any number of trading ſhips, employed in a particular branch of commerce.

The admirals of his Britannic majeſty's fleet are divided into three ſquadrons, viz. the red, the white, and the blue. When any of theſe officers are inveſted with the command of a ſquadron or detachment of men of war, the particular ſhips are diſtinguiſhed by the colours of their reſpective ſquadron: that is to ſay, the ſhips of the red ſquadron wear an enſign whoſe union is diſplayed on a red field; the enſigns of the white ſquadron have a white field; and thoſe of the blue ſquadron, a blue field; the union being common to all three. The ſhips of war therefore are occaſionally annexed to any of the three ſquadrons, or ſhifted from one to another.

Of whatſoever number a fleet of ſhips of war is compoſed, it is uſually divided into three ſquadrons; and theſe, if numerous, are again ſeparated into diviſions. The admiral, or principal officer, commands the centre; the vice-admiral, or ſecond in command, ſuperintends the van-guard; and the operations of the rear are directed by the rear-admiral, or the officer next in rank. See the article Division.

The diſpoſition of a fleet, while proceeding on a voyage, will in ſome meaſure depend on particular circumſtances; as the difficulty of the navigation; the neceſſity of diſpatch, according to the urgency or importance of the expedition; or the expectation of an enemy in the paſſage. The moſt convenient order is probably to range it into three lines or columns, each of which is parallel to a line cloſe-hauled according to the tack on which the line of battle is deſigned to be formed. This arrangement is more uſeful than any, becauſe it contains the advantages of every other form, without their inconveniencies. The fleet being thus more incloſed will more readily obſerve the ſignals, and with greater facility form itſelf into the line of battle; a circumſtance which ſhould be kept in view in every order of ſailing. See *Naval* Tactics.

Fleet, is alſo a noted priſon in London, where perſons are committed for contempt of the king and his laws, particularly of his courts of juſtice: or for debt, where any perſon will not or is unable to pay his creditors.

There are large rules and a warden belonging to the fleet priſon; which had its name from the float or fleet of the river or ditch, on the ſide whereof it ſtands.

FLEETWOOD (William), a very learned Engliſh biſhop in the beginning of the 18th century, of an ancient family in Lancaſhire. He diſtinguiſhed himſelf during king William's reign, by his *Inſcriptionum Antiquarum Sylloge*, by ſeveral ſermons he preached on public occaſions, and by his *Eſſay on Miracles*. He was deſigned by king William to a canonry of Windſor: the grant did not paſs the ſeals before the king's death, but the queen gave it him, and he was inſtalled in 1702. In 1703, he took a reſolution to retire; and in 1707, publiſhed, without his name, his *Chronicon Pretioſum*. In 1708, he was nominated by the queen to the ſee of St Aſaph. The change of the queen's miniſtry gave him much regret. In 1715, he publiſhed a pamphlet intitled "The 13th chapter of the Romans vindicated from the abuſive ſenſes put upon it." In 1714, he was tranſlated to the biſhopric of Ely; and died in 1723, aged 67. He publiſhed ſeveral other ſermons and tracts, and was a man of great learning and examplary piety.

FLEMISH, or the FLEMISH TONGUE, is that which we otherwiſe call *low Dutch*, to diſtinguiſh it from the *German*, whereof it is a corruption and a kind of dialect. See GERMAN.

It differs from the *Walloon*, which is a corruption of the French language. The Flemiſh is uſed thro' all the provinces of the Netherlands.

FLEMISH-*Bricks*, a neat, ſtrong, yellow kind of bricks, brought from Flanders, and commonly uſed in paving yards, ſtables, &c. being preferable for ſuch purpoſes to the common bricks. See the article BRICK.

FLESH, in anatomy, a ſimilar, fibrous part of an animal body, ſoft and bloody, being that whereof moſt of the other parts are compoſed, and whereby they are connected together: or more properly, it is ſuch parts of the body where the blood-veſſels are ſo ſmall, as only to retain blood enough to preſerve their colour red.

FLETA, the name given to an unknown writer who lived about the end of the reign of Edward II. and beginning of Edward III. and who being a priſoner in the Fleet, wrote there an excellent treatiſe on the common law of England.

FLETCHER. See BEAUMONT *and Fletcher*.

FLETEWOOD (William), an eminent Engliſh lawyer and recorder of London, in the reign of queen Elizabeth. He was very zealous in ſuppreſſing maſs-houſes, and committing Popiſh prieſts: but once ruſhing in upon maſs at the Portugueſe ambaſſador's houſe, he was committed to the Fleet for breach of privilege, but ſoon releaſed. Mr Wood ſays, "He was a learned man, and a good antiquary, but of a marvellous merry and pleaſant conceit. "He was a good popular ſpeaker, and wrote well upon ſubjects of government. His principal works are, 1. *Annalium tam regum Edwardi V. Richardi III. & Henrici VII. quam Henrici VIII.* 2. A table of the reports of Edmund Plowden. 3. The office of a juſtice of peace. He died about the year 1593.

FLEURI (Claude), one of the beſt French critics and hiſtorians of his age, was born at Paris in 1640. He applied himſelf to the law, was made advocate for the parliament of Paris, and attended the bar nine years; he then entered into orders, and was made preceptor to the princes of Conti. In 1689, the king made him ſub-preceptor to the dukes of Burgundy, Anjou, and Berry; and in 1706, when the education of theſe young princes was completed, the king gave him the priory of Argenteville belonging to the Benedictines in the dioceſe of Paris. In 1716, he was choſen counſellor to Lewis XV. and died in 1723. He was the author of a great number of eſteemed French works, the principal of which are, 1. An eccleſiaſtical hiſtory, in 20 volumes, the laſt of which ends with the year 1414. 2. The manners of the Iſraelites and Chriſtians. 3. Inſtitutions of eccleſiaſtical law. 4. An hiſtorical catechiſm. 3. On the choice and method of ſtudy. 6. The duties of maſters and ſervants, &c.

FLEURI (Andrew Hercules de), biſhop of Frejus, preceptor to Lewis XV. grand almoner to the queen, cardinal, and miniſter of ſtate, was born in 1653, and died in 1743. He was an able negociator; and diſtinguiſhed himſelf during his miniſtry by his probity, his zeal for the happineſs of his country, and his pacific diſpoſition.

FLEXIBLE, in phyſics, a term applied to bodies capable of being bent or diverted from their natural figure or direction.

FLEXOR, in anatomy, a name applied to ſeveral muſcles, which are ſo called from their office, which is to bend the parts to which they belong; in oppoſition to the *extenſors*, which open or ſtretch them. See ANATOMY, n° 83, n, o, p, q.

FLINT, in natural hiſtory, a kind of ſemi-tranſparent, or quite opaque ſtones; generally of a roundiſh form, and covered with white cruſt; of a ſmooth, uniform, ſhining texture; ſo hard, that they will ſtrike fire with ſteel; calcinable by fire, after which they become white, friable, and, according to Henckel, heavier than before, and ſoluble by acids; vitrifiable only by the very violent heat of the largeſt ſpeculums, ſuch as that of Villette, and not even by the focus of one of Tſchirnhauſen's lenſes, according to an experiment of Neumann. They are found generally in beds of chalk and of ſand; but never forming entire ſtrata of rock as jaſper does. By long expoſure to air and the ſun, they ſeem to decay, to loſe their luſtre, their firmneſs of texture, and to be changed to a white calcareous earth or chalk. Hence they are almoſt always found covered with a white chalky cruſt. They are alſo convertible into a calcareous earth by fuſion, or vitrification with ſo much fixed alkali, that they ſhall reſolve into a liquid maſs called the *liquamen* or *oil of flints*, and by precipitation from the fixed alkali by means of acids. See CHEMISTRY, n° 338.

FLINTS are of the claſs of earths called *vitrifiable*, becauſe theſe earths are generally employed, together with fixed alkali, as materials in the making of glaſs. See GLASS.

Breaking of FLINTS. The art of cutting, or rather breaking, flint-ſtones into uniform figures, is by ſome ſuppoſed to be one of the arts now loſt. That it was known formerly, appears from the ancient Bridewell at Norwich, from the gate of the Auguſtin friars at Canterbury, that of St John's Abbey at Colcheſter, and the gate near Whitehall Weſtminſter. But that the art is not loſt, and that the French know it, appears from the platform on the top of the royal obſervatory at Paris; which, inſtead of being leaded, is paved with flint cut or broke into regular figures. But we know not that this art hath been any where deſcribed.

FLINTSHIRE, a county of Wales, bounded on the north by the Iriſh ſea and the river Dee, on the eaſt by Cheſhire, and every where elſe by Denbighſhire and Shropſhire. It is the leaſt of all the counties of Wales, extending in length between 20 and 30 miles, and in breadth about eight. It is divided into five hundreds; and contains about 28 pariſhes, and 32,000 inhabitants. The air is healthful, but pretty ſharp; the ſoil is tolerably fertile, eſpecially in the valleys, producing plenty of wheat, barley, oats, and rye. A conſiderable number of cattle are reared in this county, but they are of a ſmall ſize. There is plenty of honey, of which the inhabitants make metheglin,

theglin, a drink much uſed in Wales. Here are alſo pit-coal, lead-ore, mill-ſtones, fiſh and fowl, but little wood or fruit.

FLOAT, a certain quantity of timber bound together with rafters athwart, and put into a river to be conveyed down the ſtream; and even ſometimes to carry burdens down a river with the ſtream.

Float-*Boards*, thoſe boards fixed to water-wheels of under-ſhot mills, ſerving to receive the impulſe of the ſtream, whereby the wheel is carried round. See the articles Wheel and Mill.

It is no advantage to have too great a number of float-boards; becauſe, when they are all ſtruck by the water in the beſt manner that it can be brought to come againſt them, the ſum of all the impulſes will be but equal to the impulſe made againſt one float-board at right angles, by all the water coming out of the penſtock through the opening, ſo as to take place on the float-board. The beſt rule in this caſe is, to have juſt ſo many, that each of them may come out of the water as ſoon as poſſible, after it has received and acted with its full impulſe. As to the length of the float-board, it may be regulated according to the breadth of the mill. See the article Mill.

Floats *for Fiſhing*. See Fishing-*Floats*.

FLOATAGES, all things floating on the ſurface of the ſea or any water; a word much uſed in the commiſſions of water-bailiffs.

Floating-*Bridge*. See Bridge.

FLOOD. See Deluge.

Deucalion's Flood. See Deucalion.

FLOOKING, among miners, a term uſed to expreſs a peculiarity in the load of a mine. The load, or quantity of ore is frequently intercepted in its courſe by the croſſing of a vein of earth or ſtone, or ſome different metallic ſubſtance; in which caſe the load is moved to one ſide, and this tranſient part of the land is called a *flooking*.

FLORA, the goddeſs of flowers, was, according to the poets, the wife of Zephyrus, and was firſt honoured among the Sabines; but, according to Lactantius, ſhe was a lady of pleaſure, who, having gained large ſums of money by proſtituting herſelf, made the Roman people her heir, on condition that certain games, called *Floralia*, might be annually celebrated on her birth-day. Her image in the temple of Caſtor and Pollux was dreſſed in a cloſe habit, and ſhe held in her hands the flowers of peaſe and beans: but the modern poets and painters have been more laviſh in ſetting off her charms, conſidering that no parts of nature offered ſuch innocent and exquiſite entertainment to the ſight and ſmell, as the beautiful variety which adorns, and the odour which embalms, the floral creation.

FLORALIA, in Roman antiquity, a feſtival in honour of Flora, obſerved on the 29th of April, or the fifth of the calends of May, at which time games were celebrated in the Campus Martius, which were proclaimed by ſound of trumpet. Theſe games were celebrated in a very ſcandalous manner: and were in ſome ſenſe the feſtival of the courtezans. To hide the ſhameful origin of this feſtival, the ſenate made the people believe Flora was a goddeſs, who preſided over flowers; and that, in order to have a good crop, it was neceſſary to honour that goddeſs every year.

FLOOR, in architecture, the under ſide of a room, or that part we walk on.—Floors are of ſeveral ſorts; ſome of earth, ſome of brick, ſome of ſtone, and ſome of wood. See Architecture, n°116. and Paving.

Floor *of a Ship*, as much of her bottom as ſhe reſts upon when ſhe reſts on the ground.—Such ſhips as have long and broad floors, lie on the ground with moſt ſecurity; and thoſe that are narrow in the floor, cannot be grounded without danger either of being overſet, or at leaſt of hurting their ſides.

FLORENCE, one of the ſtates of Tuſcany in Italy; a moſt celebrated republic, to which Europe is in the higheſt degree indebted for the revival of the arts and ſciences after they had been long loſt.

The ancient hiſtory of Florence is comprehended under that of Hetruria and Rome. Its modern hiſtory commences moſt properly at the time of *Alboine*, king of the Lombards, who made himſelf maſter of Tuſcany, and almoſt all Italy. Thoſe people continued to enjoy their dominion for 204 years, when they were driven out by Charles the Great. He was crowned and confirmed king of Italy by the pope about the year 773; after which, the governments of the ſeveral ſtates of that country began to recover ſome degree of regularity and conſiſtency. The original families of Italy, and the deſcendents of the various clans of barbarians who had inhabited it, were now blended into one common maſs; and the feodal laws, which were of Gothic original, and then prevailed over all Italy, gave the leading men or magiſtrates of each ſtate a degree of authority very little inferior to that of the king. All that Charles required, was the payment of certain tributes, or what we call *reddendos*, as marks of his ſovereignty; and he left them in other reſpects to make the moſt of their ſituation and natural powers. Of theſe ſtates, the moſt eminent were Florence, Piſa, Perugia, and Sienna, each of which had a particular manner of cultivating its intereſt. The Piſans applied themſelves to maritime affairs, being the only maritime city of Tuſcany that was left ſtanding. The Perugians applied themſelves to agriculture, to which they were encouraged by the fertility of their ſoil. The Sienneſe had a rich nobility, who maintained them in affluence: but the Florentines were diſtinguiſhed over all the other inhabitants of Tuſcany, by their induſtry, their knowledge of the civil arts, and their uncommon ſtrength of genius.

For ſome time thoſe ſtates lived together in great harmony; but this was ſoon interrupted by the diſputes between the popes and the emperors of Germany. In theſe conteſts, Florence was ſubdued by the emperor Frederic II. He governed in ſo tyrannical a manner, that, after his death, the Florentines conceived ſuch an inſuperable averſion againſt monarchical government, that from thenceforth Florence became a republic. The people took the direction of affairs upon themſelves; and the wiſdom, ſpirit, and ſteadineſs, with which they proceeded upon their new model, are almoſt incredible. They firſt recalled, and reinſtated in their former honours, the noblemen whom Frederic had baniſhed. They next made choice of 12 magiſtrates, whom they called *antiani*. They divided their city into ſix wards, from which their magiſtrates and all public officers were to be elected. They inſtituted a militia out of theſe wards, properly regimented; in order to oppoſe all factious deſigns of their nobles at home, and to repel all attacks from abroad. Every one of the magiſtrates was a patriot; and Florence ſoon began to diſtinguiſh itſelf among the ſtates of Italy, as formerly Athens did among thoſe of Greece.

It is natural to think, that a ſmall ſtate, ſo circumſtanced and regulated, would ſoon be involved in wars both foreign and domeſtic. This indeed actually happened. The Florentines were engaged in almoſt perpetual wars with their neighbours; and when theſe ceaſed, internal diſſenſions generally ſupplied their place. Though greatly celebrated by hiſtorians for their valour, theſe republicans never could make any permanent conqueſt over their neighbours, or extend their territories in any conſiderable degree. Nay, they were often in the utmoſt danger of being totally deſtroyed, had not ſome lucky accidents ſeaſonably intervened. In theſe endleſs wars, they were ſupported by the very extenſive commerce they carried on, and by which they acquired incredible wealth. But, after commerce had begun more generally to diffuſe itſelf, the Florentines began to loſe very conſiderably of the importance among other nations which they had till then maintained. In 1531, they were compelled to ſubmit to the troops of the emperor Charles V. after a ſevere ſiege; and at this time ended the republican government of the city. Alexander de Medici, after marrying the natural daughter of Charles V. was by him made ſovereign of Florence. He pretended to govern by the advice of a council of Florentine citizens; but, in fact, behaved ſo tyrannically, that he was murdered in a ſhort time; and ſucceeded by Coſmo, ſon of John de Medici, who had become extremely popular on account of the bravery he had ſhown in the French and Spaniſh ſervice. He firſt obtained the title of *Grand Duke of Tuſcany*; and, as ſuch, was crowned at Rome by pope Pius V. who beſtowed the title upon him. He married Eleanora de Toledo, daughter to the duke of Naples; by which connection he eſtabliſhed his authority ſo well, that the Florentines never thought of throwing off the yoke. He attached himſelf to the intereſt of the Imperialiſts; under whoſe protection he and his ſucceſſors lived ſecurely, till the time of Coſmo III. who embraced the French intereſt. This prince, in his youth, had paid a viſit to the Engliſh court in the time of Charles II. and always profeſſed a great deal of friendſhip for the family of Stuart. We do not find, however, that he was very liberal in contributing towards the efforts made for replacing king James on the throne of Britain, though often applied to for that purpoſe. He affected, however, to be the head and patron of all the Roman Catholics in Great Britain, and he exerted all his intereſt with foreign courts in their behalf. Being a complete politician, his ſucceſs in this was incredible; and it was primarily owing to him, that the papiſts met with ſuch indulgences as they did, even after the acceſſion of king George I. He was a great patron of learning and learned men; and his favourite ſtudy was chemiſtry, nor could his friends oblige him more than by ſending for medicines prepared in his laboratory by himſelf. He was courted by all the princes of Europe; and could be called unhappy only in the proſpect of his race being extinct with his ſon, who had no hopes of iſſue, and was the laſt of the family. This conſideration probably rendered him indifferent to all the ſtipulations preceding the Quadruple Alliance in 1718; by the fifth article of which, the duchies of Tuſcany, Parma, and Placentia, were to be accounted for ever as male-fiefs of the empire, and were to deſcend, in default of male-heirs, to the queen of Spain's eldeſt ſon. To alleviate, however, any chagrin which might be conceived at this article, it was alſo ſtipulated, that, during the lives of the poſſeſſors of Tuſcany and Parma, no forces of any country whatſoever, whether their own or hired, ſhould, by the emperor, the kings of France and Spain, or even by the prince appointed to the ſucceſſion, be introduced into any garriſon, city, port, or town, of thoſe duchies. Yet, notwithſtanding this article, it was reſolved, that, for the ſecurity of the ſucceſſion, 6000 Swiſs were to be put into Leghorn, Porto Ferraro, Parma, and Placentia.—Coſmo did not long ſurvive this deſtination of his dominions; but died, the moſt aged prince in Chriſtendom, in 1723. He was ſucceeded by his ſon Gaſton, whoſe character and manner of life greatly reſembled thoſe of his father. He preſented memorials againſt the Quadruple Alliance at the Congreſs at Cambray. King George I. declined the ſole mediation at this congreſs which was offered him; upon which the emperor, without the conſent of the empire, granted the inveſtiture of the duchies of Tuſcany, Parma, and Placentia, to the queen of Spain's eldeſt ſon, in caſe theſe dukedoms ſhould be vacant for want of heirs. Theſe ſtipulations were enforced by the treaty of Seville in 1728; by which, alſo, great numbers of foreign troops were to be introduced into different cities within theſe duchies. This treaty was guarantied by Spain, Great Britain, France, and the States-General; but was complained of by the court of Vienna as a breach of an article in the Quadruple Alliance. In the year 1731, however, the great duke, who had conceived an invincible averſion againſt the houſe of Auſtria, not only ratified all the ſtipulations with regard to the ſucceſſion, but, in conſequence of a new treaty, invited Don Carlos, the apparent ſucceſſor, over to Florence to be educated.—In a few years, however, the emperor loſt Naples and Sicily; and his ſon-in-law, the duke of Lorrain, was named to the ſucceſſion of Tuſcany, while his duchy of Lorrain was annexed to the crown of France. Duke Gaſton, in the mean time, was ſo much decayed in perſon and intellects, that he took little or no concern about theſe proceedings; nor did he even make any remonſtrances againſt the Imperial court, who ordered a body of troops to move towards his dominions, in order to drive out the Spaniards, which they accordingly did. He died in July 1737; and the duke of Lorrain inſtantly ſeized on his dominions. The queen of Spain could not bear the thoughts of having ſuch a noble acquiſition as the duchy of Tuſcany torn from her family, and therefore endeavoured to engage the court of Great Britain to aſſiſt her in recovering it. To this end ſhe promiſed, that her huſband ſhould renounce all pretenſions to Gibraltar and Portmahon, and that the differences ſubſiſting with regard to America ſhould be adjuſted. This propoſal, however, was rejected; and a war enſued between Great Britain and Spain, and the duke of Lorrain (late emperor of Germany) was ſuffered to poſſeſs the duchy of Tuſcany without oppoſition. Since that time the Florentines have made no figure in hiſtory, nor are they likely to do ſo for a long time to come. In the year 1753 it was reſolved, that the whole military force of the great duchy ſhould conſiſt only of three regiments of foot, and one of dragoons, of 500 men each. To ſupport this eſtabliſhment, a French company offered to farm the revenues of the duchy; but his imperial majeſty rejected the propoſal, and fixed upon another company compoſed of his own ſubjects, to manage the revenues under the direction of M. Richard, a gentleman of Lorrain. By this new inſtitution, the finances of the duchy were divided into 20 ſhares, one half of which his imperial majeſty reſerved to himſelf. By thoſe, and other frugal meaſures, the emperor was enabled to erect a college for the improvement of agriculture at Florence; a ſcience to which the Florentines are peculiarly adapted. In the year 1755, he raiſed another regiment of dragoons, and regimented his militia. The duchy is now governed by a council of regency, a military board, and other officers of ſtate; who have made a number of excellent regulations, by which, during the late war, his imperial majeſty was enabled to draw many uſeful recruits from the grand duchy of Tuſcany, who did him great ſervice in his armies.

FLORENCE, the capital of the duchy of Tuſcany, and one of the fineſt cities in Italy. It is divided into two by the river Arno, over which are built ſeveral magnificent bridges. It is ſurrounded on all ſides but one with high hills, which riſe inſenſibly, and at laſt join with the lofty mountains called the *Appennines*. Towards Piſa, there is a vaſt plain of 40 miles in length; which is ſo filled with villages and pleaſure-houſes, that they ſeem to be a continuation of the ſuburbs of the city. The circumference about the walls is near ſix Engliſh ſtatute-miles; and it contains about 9000 houſes, great part of which are built uniformly of ſtone, and many of them ſurpriſingly large and beautiful. According to ſome, the palaces of Florence are the beſt built of any in Italy. E. Long. 12. 24. N. Lat. 43. 34.

FLORENCE, an ancient piece of Engliſh gold coin. Every pound weight of ſtandard-gold was to be coined into 50 Florences to be current at ſix ſhillings each; all which made in tale 15 pounds; or into a proportionate number of half-Florences or quarter-pieces, by indenture of the mint: 18 Ed. III.

FLORENTINE MARBLE. See CITADENESCA.

FLORESCENTIA, (from *floreſco*, "to flouriſh or bloom;") the act of flowering, which Linnæus and the ſexualiſts compare to the act of generation in animals; as the ripening of the fruit in their opinion reſembles the birth. See FLOWER.

FLORID STYLE, is that too much enriched with figures and flowers of rhetoric.

FLORIDA, the moſt ſoutherly province of the Britiſh empire in America, bounded on the ſouth by the Gulf of Mexico, on the north by the Apalachian mountains, on the eaſt by the province of Georgia, and on the weſt by the river Miſſiſſippi. It was firſt diſcovered, in 1497, by Sebaſtian Cabot, a Venetian, then in the Engliſh ſervice; whence a right to the country was claimed by the kings of England; and this province, as well as Georgia, were included in the charter granted by Charles II. to Carolina. In 1512, however, Florida was more fully diſcovered by Ponce de Leon, an able Spaniſh navigator, but who undertook his voyage from the moſt abſurd motives that can be well imagined.—The Indians of the Caribbee iſlands had among them a tradition, that ſomewhere on the continent there was a fountain whoſe waters had the property of reſtoring youth to all old men who taſted them. The romantic imaginations of the Spaniards were delighted with this idea. Many embarked in voyages to find out this imaginary fountain, who were never afterwards heard of. Their ſuperſtitious countrymen never imagined that theſe people had periſhed. They concluded that they did not return, only becauſe they had drunk of the immortalizing liquor, and had diſcovered a ſpot ſo delightful, that they did not chooſe to leave it.—Ponce de Leon ſet out with this extravagant view as well as others, and fully perſuaded of the exiſtence of a third world, the conqueſt of which was to immortalize his name. In the attempt to diſcover this country, he rediſcovered Florida; but returned to the place from whence he came, viſibly more advanced in years than when he ſet out.—For ſome time this country was neglected by the Spaniards, and ſome Frenchmen ſettled in it. But, the new colony being neglected by the miniſtry, and Philip II. of Spain having accuſtomed himſelf to think that he was the ſole proprietor of America, fitted out a fleet at Cadiz to deſtroy them. His orders were executed with barbarity. The French entrenchments were forced, and moſt of the people killed. The priſoners were hanged on trees; with this inſcription, "Not as Frenchmen, but as Heretics."

This cruelty was ſoon after revenged by Dominic de Gourgues, a ſkilful and intrepid ſeaman of Gaſcony, an enemy to the Spaniards, and paſſionately fond of hazardous expeditions and of glory. He ſold his eſtate; built ſome ſhips; and with a ſelect band of adventurers like himſelf, embarked for Florida. He drove the Spaniards from all their poſts with incredible valour and activity; defeated them in every rencounter; and, by way of retaliation, hung the priſoners on trees, with this inſcription, "Not as Spaniards, but as Aſſaſſins." This expedition was attended with no other conſequences: Gourgues blew up the forts he had taken, and returned home, where no notice was taken of him. It was conquered in 1539, by the Spaniards under Ferdinand de Soto, not without a great deal of bloodſhed; as the natives were very warlike, and made a vigorous reſiſtance. The ſettlement, however, was not fully eſtabliſhed till the year 1665; when the town of St Auguſtine, the capital of the colony while it remained in the hands of the Spaniards, was founded. In 1586, this place was taken and pillaged by Sir Francis Drake. It met with the ſame fate in 1665, being taken and plundered by Captain Davis and a body of bucaneers. In 1702, an attempt was made upon it by colonel More, governor of Carolina. He ſet out with 500 Engliſh, and 700 Indians; and having reached St Auguſtine, he beſieged it for three months; at the expiration of which, the Spaniards having ſent ſome ſhips to the relief of the place, he was obliged to retire. In 1740, another attempt was made by general Oglethorpe: but he being outwitted by the Spaniſh governor, was forced to raiſe the ſiege with loſs; and Florida continued in the hands of the Spaniards till the year 1763, when it was ceded by treaty to Great Britain.—The province is now divided into two governments, the Eaſt and Weſt Florida; but concerning theſe there are very few accounts which can be depended upon as authentic. According to ſome, the air is extremely pure and healthy; while others report, that it is to the laſt degree noxious. As little can be depended on what is ſaid concerning the ſoil: ſome affirming that it is exceedingly fertile, and productive of all the neceſſaries of life; while others tell us that it is quite barren and ſandy. It was at firſt thought that ſilk, cochineal, and wine, might have been plentifully produced in this province; but whether any of theſe commodities have yet been produced in any part of Florida in ſuch abundance as to give hopes of at laſt ſupplying the demands of Great Britain from that quarter, is as yet by no means aſcertained.

FLORIN, is ſometimes uſed for a coin, and ſometimes for a money of account.

Florin, as a coin, is of different values, according to the different metals and different countries where it is ſtruck. The gold florins are moſt of them of a very coarſe alloy, ſome of them not exceeding thirteen or fourteen carats, and none of them ſeventeen and a half. See MONEY-*Table*.

Florin, as a money of account, is uſed by the Italian, Dutch, and German merchants and bankers, but admits of different diviſions in different places. *Ibid.*

FLORIST, a perſon well ſkilled in flowers, their kinds and cultivation.

FLORUS (Lucius Annæus), a Latin hiſtorian, of the ſame family with Seneca and Lucan. He flouriſhed in the reigns of Trajan and Adrian; and wrote, in an elegant ſtyle, an Abridgment of the Roman Hiſtory, of which there have been many editions. The beſt are, *Ad Uſum Delphini*, 4to; and, *Cum notis variorum et Dukeri*, 8vo.

FLORY, FLOWRY, or *Fleury*, in heraldry, a croſs that has the flowers at the end circumflex and turning down; differing from the *potence*, in as much as the latter ſtretches out more like that which is called *patee*.

FLOS, FLOWER, in botany, See FLOWER.

Fæmineus FLOS, a female flower. By this name Linnæus and the ſexualiſts denominate a flower which is furniſhed with the pointal or female organs of generation, but wants the ſtamina or male organ. Female flowers may be produced apart from the male, either on the ſame root or on diſtinct plants. Birch and mulberry are examples of the firſt caſe; willow and poplar of the ſecond.

FLOS, in chemiſtry, the moſt ſubtile part of bodies ſeparated from the more groſs parts by ſublimation in a dry form.

FLOTA, or FLOTTA, *Fleet*, a name which the Spaniards give particularly to the ſhips that are annually ſent from Cadiz to the port of Vera Cruz, to fetch thence the merchandizes gathered in Mexico for Spain. This fleet conſiſts of the captains, admiral, and patach or pinnace, which goes on the king's account; and about 16 ſhips from 400 to 1000 tons belonging to particular perſons. They ſet out from Cadiz about the month of Auguſt, and return in about 18 or 20 months.

FLOTSON, or FLOSTOM, goods that by ſhipwreck are loſt, and floating upon the ſea; which, with jetſon and lagan, are generally given to the lord admiral: but this is the caſe only where the owners of ſuch goods are not known. And here it is to be obſerved, that *jetſon* ſignifies any thing that is caſt out of a ſhip when in danger, and afterwards is beat on the ſhore by the water, notwithſtanding which the ſhip periſhes. *Lagan* is where heavy goods are thrown overboard, before the wreck of the ſhip, and ſink to the bottom of the ſea.

FLOUNDER, FLUKE, or *But*, in ichthyology. See PLEURONECTES.

Flounders may be fiſhed for all day long, either in a ſwift ſtream, or in the ſtill deep water; but beſt in the ſtream, in the months of April, May, June, and July: the moſt proper baits are all ſorts of worms, waſps, and gentles.

FLOUR, the meal of wheat-corn, finely ground and ſifted. See MEAL.

The grain itſelf is not only ſubject to be eaten by inſects in that ſtate; but, when ground into flour, it gives birth to another race of deſtroyers, who eat it unmercifully, and increaſe ſo faſt in it, that it is not long before they wholly deſtroy the ſubſtance. The fineſt flour is moſt liable to breed theſe, eſpecially when ſtale or ill prepared. In this caſe, if it be examined in a good light, it will be obſerved to be in continual motion, and on a nicer inſpection there will be found in it a great number of little animals of the colour of the flour, and very nimble. If a little of this flour is laid on the plate of the double microſcope, the inſects are very diſtinctly ſeen in great numbers, very briſk and lively, continually crawling over one another's backs, and playing a thouſand antic tricks together; whether in diverſion, or in ſearch of food, is not eaſy to be determined. Theſe animals are of an oblong and ſlender form; their heads are furniſhed with a kind of trunk or hollow tube, by means of which they take in their food, and their body is compoſed of ſeveral rings. They do vaſt miſchief among magazines of flour laid up for armies and other public uſes. When they have once taken poſſeſſion of a parcel of this valuable commodity, it is impoſſible to drive them out; and they increaſe ſo faſt, that the only method of preventing the total loſs of the parcel is to make it up into bread as ſoon as can be done. The way to prevent their breeding in the flour is to preſerve it from damp: nothing gets more injury by being put up in damp than flour; and yet nothing is more frequently put up ſo. It ſhould be always carefully and thoroughly dried before it is put up; and the barrels alſo dried into which it is to be put; then, if they are placed in a room tolerably warm and dry, they will keep it well. Too dry a place never does flour any hurt, though one too moiſt almoſt always ſpoils it.

Flour, when carefully analyzed, is found to be compoſed of three very different ſubſtances. The firſt and moſt abundant is pure *ſtarch*, or white fecule, inſoluble in cold but ſoluble in hot water, and of the nature of mucous ſubſtances; which, when diſſolved, form water-glues. The ſecond is the *gluten*, moſt of whoſe properties have been deſcribed under the article BREAD. The third is of a mild nature, perfectly ſoluble in cold water, of the nature of *ſaccharine* extractive mucous matters. It is ſuſceptible of the ſpirituous fermentation, and is found but in ſmall quantity in the flour of wheat. See Bread, Gluten, Starch, and Sugar.

FLOWER, Flos, among botaniſts and gardeners, the moſt beautiful part of trees and plants, containing the organs or parts of fructification,

Though no parts of plants are more generally known than their flowers, yet the definitions given by different authors of this word are very various, and neceſſary to be explained in order to the underſtanding of their works. Jungius defines it to be the moſt tender part of a plant, remarkable for its colour or form, or for both, and cohering with the fruit. But this author himſelf acknowledges his definition to be too limited, as there are ſeveral plants whoſe flowers are produced remote from their fruit. Mr Ray, ſays the flowers cohere for the moſt part with the rudiments of the fruit; which is likewiſe a phraſeology too inaccurate to be admitted in definitions. Tournefort defines the flower to be a part of a plant very often remarkable for its peculiar colours, for the moſt part adhering to the young fruit, to which it ſeems to afford the firſt nouriſhment, in order to explicate its moſt tender parts: but this is ſtill a more indeterminate definition than the former.—Pontedera defines a flower to be a part of a plant, unlike the reſt in form and nature. If the flower has a tube, it adheres to or is fixed very near the embryo, to the uſe of which it is ſubſervient; but if the flower has no tube, then its baſe does not adhere to the embryo. This definition is ſcarce intelligible, except to expert botaniſts. Juſſieu defines a flower to be compoſed of chives and a piſtillum, and to be of uſe in the generation of the plant: but this definition is too imperfect, as there are many plants in which the piſtillum are found at a great diſtance from the chives, many flowers which have no piſtillum, and many which have no chives. Vaillant has been happier in his definition. He ſays, that flowers are the organs which conſtitute the ſexes of plants, which are ſometimes found naked, and without any covering; and that the petals which moſt of them have, are noway eſſential to their uſe, but ſerve, and are intended, merely as covers for them: but yet, as theſe coats or coverings are the moſt conſpicuous and moſt beautiful parts of the flowers, theſe are to be called *flowers*, be they of whatever form or ſtructure or colour; and whether they contain the organs of both ſexes in each individual, or only of one, or even but of ſome part of one, provided they are not of the ſame figure and colour with the leaves of the plant. The ſhorteſt and moſt expreſs definition, however, ſeems to be that of Martin; which is, that flowers are the organs of generation of both ſexes, adhering to a common placenta, together with their common covering; or of either ſex ſeparately with its proper coverings if it have any.

The parts of flowers are, 1. The piſtillum or ovary, which is the rudiment of the fruit, and is therefore properly the organ of generation. 2. The ſtyle, which is a body accompanying the ovary; either ariſing from the middle of it, or ſtanding as an axis in the middle, with the embryos of the ſeeds round it. 3. The ſummits, called alſo *apices*, and *antheræ*, which are thoſe bodies that contain the prolific powder analogous to the male ſperm of animals, and generally hung upon ſlender threads which are called the *chives*. 4. The petals, commonly called the *flower-leaves*, which are thoſe tender fine-coloured leaves that are generally the moſt conſpicuous parts of a flower. 5. The empalement or calyx, which is formed of theſe tender leaves that cover the outer parts of the flower.—Flowers, according to the number of their leaves or petals, are called *monopetalous*, or one-leaved; *dipetalous*, or two-leaved, &c.

The ſtructure of different flowers is very various; but Dr Grew has obſerved that the far greater number of them have the empalement, foliation, chives, &c. Mr Ray accounts that every perfect flower has the petals, ſtamina or chives, apices or ſummits, and the ſtyle or piſtil; and ſuch as want any of theſe he calls imperfect flowers. The greater number of plants have a flower-cup; which is of a firmer ſtructure than their leaves, and ſerves for their ſupport.

Flowers, deſigned for medicinal uſe, ſhould be plucked when they are moderately blown, and on a clear day before noon: for conſerves, roſes muſt be taken in the bud.

Eternal Flower. See Xeranthemum.

Everlaſting Flower. See Gnaphalium.

Flower-*Fence*. See Poinciana.

Sun-Flower. See Helianthus.

Sultan-Flower. See Cyanus.

Trumpet-Flower. See Bignonia.

Wind-Flower. See Anemone.

Flower-*de-Luce*. See Iris.

Flowers, in heraldry. They are much uſed in coats of arms; and in general ſignify hope, or denote human frailty and momentary proſperity. See Rose, &c.

Flowers, in chemiſtry. By this name are generally underſtood bodies reduced into very fine parts, either ſpontaneouſly, or by ſome operation of art; but the term is chiefly applied to volatile ſolid ſubſtances, reduced into very fine parts, or into a kind of meal by ſublimation.—Some flowers are nothing elſe than the bodies themſelves, which are ſublimed entire, without ſuffering any alteration or decompoſition; and other flowers are ſome of the conſtituent parts of the body ſubjected to ſublimation.

Colours of Flowers. See the article Colour *of Plants*.

Colours extracted from Flowers. See Colour-*Making*, n° 34, 38.

Preſerving of Flowers. The method of preſerving flowers in their natural beauty through the whole year has been much ſought after by many people. Some have attempted it by gathering them when dry and not too much opened, and burying them in dry ſand; but this, though it preſerves their figure well, takes off from the livelineſs of their colour. Muntingius prefers the following method to all others. Gather roſes, or other flowers, when they are not yet thoroughly open, in the middle of a dry day: put them into a good earthen veſſel glazed within; fill the veſſel up to the top with them; and when full ſprinkle them over with ſome good French wine, with a little ſalt in it; then ſet them by in a cellar, tying down the mouth of the pot. After this they may be taken out at pleaſure; and, on ſetting them in the ſun, or within reach of the fire, they will open as if growing naturally.

ly; and not only the colour, but the ſmell alſo will be preſerved.

The flowers of plants are by much the moſt difficult parts of them to preſerve in any tolerable degree of perfection; of which we have inſtances in all the collections of dried plants, or *horti ſicci*. In theſe the leaves, ſtalks, roots, and ſeeds of the plants appear very well preſerved; the ſtrong texture of theſe parts making them always retain their natural form, and the colours in many ſpecies naturally remaining. But where theſe fade, the plant is little the worſe for uſe as to the knowing the ſpecies by it. But it is very much otherwiſe in regard to flowers: theſe are naturally by much the moſt beautiful parts of the plants to which they belong; but they are ſo much injured in the common way of drying, that they not only loſe, but change their colours one into another, by which means they give a handle to many errors; and they uſually alſo wither up, ſo as to loſe their very form and natural ſhape. The primroſe and cowſlip kinds are very eminent inſtances of the change of colours in the flowers of dried ſpecimens: for thoſe of this claſs of plants eaſily dry in their natural ſhape; but they loſe their yellow, and, inſtead of it, acquire a fine green colour much ſuperior to that of the leaves in their moſt perfect ſtate. The flowers of all the violet kind loſe their beautiful blue, and become of a dead white; ſo that in dried ſpecimens there is no difference between the blue-flowered violet, and the white-flowered kinds.

Sir Robert Southwell has communicated to the world a method of dying plants, by which this defect is propoſed to be in a great meaſure remedied, and all flowers preſerved in their natural ſhape, and many in their natural colours.—For this purpoſe two plates of iron are to be prepared of the ſize of a large half-ſheet of paper, or larger, for particular occaſions: theſe plates muſt be made ſo thick as not to be apt to bend; and there muſt be a hole made near every corner for the receiving a ſcrew to faſten them cloſe together. When theſe plates are prepared, lay in readineſs ſeveral ſheets of paper, and then gather the plants with their flowers when they are quite perfect. Let this be always done in the middle of a dry day; and then lay the plant and its flower on one of the ſheets of paper doubled in half, ſpreading out all the leaves and petals as nicely as poſſible. If the ſtalk is thick, it muſt be pared or cut in half, ſo that it may lie flat; and if it is woody, it may be peeled, and only the bark left. When the plant is thus expanded, lay round about it ſome looſe leaves and petals of the flower, which may ſerve to complete any part that is deficient. When all is thus prepared, lay ſeveral ſheets of paper over the plant, and as many under it; then put the whole between the iron plates, laying the papers ſmoothly on one, and laying the other evenly over them: ſcrew them cloſe, and put them into an oven after the bread is drawn, and let them lie there two hours. After that, make a mixture of equal parts of aquafortis and common brandy; ſhake theſe well together, and when the flowers are taken out of the preſſure of the plates, rub them lightly over with a camel's-hair pencil dipped in this liquor; then lay them upon freſh brown paper, and covering them with ſome other ſheets, preſs them between this and other papers with a handkerchief, till the wet of theſe liquors is dried wholly away. When the plant is thus far prepared, take the bulk of a nutmeg of gum-dragon; put this into a pint of fair water cold, and let it ſtand 24 hours; it will in this time be wholly diſſolved: then dip a fine hair-pencil in this liquor, and with it daub over the back ſides of the leaves, and lay them carefully down on a half-ſheet of white paper fairly expanded, and preſs them down with ſome more papers over theſe. When the gum-water is fixed, let the preſſure and papers be removed, and the whole work is finiſhed. The leaves retain their verdure in this caſe, and the flowers uſually keep their natural colours. Some care, however, muſt be taken, that the heat of the oven be not too great. When the flowers are thick and bulky, ſome art may be uſed to pare off their backs, and diſpoſe the petals in a due order; and after this, if any of them are wanting, their places may be ſupplied with ſome of the ſupernumerary ones dried on purpoſe; and if any of them are only faded, it will be prudent to take them away, and lay down others in their ſtead: the leaves may be alſo diſpoſed and mended in the ſame manner.

Another method of preſerving both flowers and fruit ſound throughout the whole year is alſo given by the ſame author. Take ſalt-petre one pound; armenian bole, two pounds; clean common ſand, three pounds. Mix all well together: then gather fruit of any kind that is not fully ripe, with the ſtalk to each; put theſe in, one by one, into a wide-mouthed glaſs, laying them in good order. Tie over the top with an oil-cloth, and carry them into a dry cellar, and ſet the whole upon a bed of the prepared matter of four inches thick in a box. Fill up the remainder of the box with the ſame preparation; and let it be four inches thick all over the top of the glaſs, and all round its ſides. Flowers are to be preſerved in the ſame ſort of glaſſes, and in the ſame manner; and they may be taken up after a whole year as plump and fair as when they were buried.

Flower *de lis*, or *Flower de luce*, in heraldry, a bearing repreſenting the lily, called the *queen of flowers*, and the true hieroglyphic of royal majeſty; but of late it is become more common, being borne in ſome coats one, in others three, in others five, and in ſome *ſemee* or ſpread all over the eſcutcheon in great numbers.

The arms of France are, three flower de lis or, in a field azure.

FLOWERING *of Bulbous* Plants. Theſe plants will grow and flower in water alone, without any earth, and make a very elegant appearance. We daily ſee this practiſed in ſingle roots; but there is a method of doing it with ſeveral roots in the ſame veſſel. Take a common ſmall garden-pot; ſtop the hole at the bottom with a cork, and lute in the cork with putty, that no water can get through; then fit a board to the top of the pot, and bore ſix or ſeven holes in it at equal diſtances, to place the bulbs in; and as many ſmaller ones near them to receive ſticks, which will ſerve to tie up the flowers. Then fill up the pot with water to the board; and place tulips, jonquils, narciſſus's, and the like plants in the root upon the holes, ſo that the bottom of the roots may touch the water: thus will they all flower early in the ſeaſon, and be much more beautiful than any pot of gathered flowers, and will laſt many weeks in their full perfection. After the ſeaſon of flowering is over, the roots will gradually ſhrink through the holes of the board, and get looſe into the water: but, inſtead of being ſpoiled there, they will ſoon increaſe in ſize; ſo that they cannot return thro' the holes, and will produce ſeveral off-ſets. It is natural to try from this the conſequence of keeping the roots under water during the whole time of their blowing; and in this way they have been found to ſucceed very well, and flower even ſtronger and more beautifully than when in the ground. They may thus, alſo, with proper care in the degree of heat in the room, be kept flowering from before Chriſtmas till March or April. It is not eaſy, in this laſt manner, to manage the keeping the boards under water; for which reaſon, it is better to procure ſome ſheet-lead of about four pounds to the foot, and cut this to the ſize of the mouth of the pot. In this there ſhould be bored holes for the bulbs, and other holes for the ſticks: and, in order to keep the ſticks quite firm, it is proper to have another plate of lead ſhaped to the bottom of the pot, with holes in it, anſwering to thoſe of the upper plate made for the ſticks. The ſticks will by this means be always kept perfectly ſteady; and the roots, being kept under water by the upper plate of lead, will flower in the moſt vigorous and beautiful manner imaginable.—Some have thought of adding to the virtues of the water by putting in nitre in ſmall quantities, and others have added earth and ſand at the bottom; but it has always been found to ſucceed better without any addition.

It may be more agreeable to ſome to uſe glaſs-jars in this laſt method with the leads, inſtead of earthen pots. The bulbs ſucceed full as well in theſe; and there is this advantage, that the progreſs of the roots is ſeen all the while, and they are managed better as to the ſupply of water.

By repeated experiments in this way on dried bulbs, and on thoſe taken freſh out of the ground, the former have been found to ſucceed the beſt. For thoſe taken freſh out of the ground being full of moiſture, will not ſo ſoon, upon changing their element, be nouriſhed fully by a new one; and the fibres which they had ſtruck in the ground, always rot when put into the water, and new ones muſt be formed in their places; ſo that it requires more time for them to come to flowering. The bulbs themſelves will not rot in this manner; but they will never be ſo ſtrong as thoſe which were put into the water dry, which gradually fill themſelves with moiſture from it, and regularly plump up. The beſt method of managing the whole proceſs is this: Place the bulbs at firſt only on the ſurface of the water; for thus they will ſtrike out their fibres moſt ſtrongly. When they have ſtood thus ſix weeks, pour in the water ſo high as to cover them entirely, and keep them thus till they have done flowering.

Sometimes the roots will become mouldy in ſeveral parts while they ſtand above the water, and the cleaning them of it is to no purpoſe; for it will eat and ſpread the farther, and frequently eat through two or three of their coats. In this caſe they muſt be immediately covered with water; when the mould will be ſtopped, and the roots become ſound, and flower as well as thoſe which never had any ſuch diſtemper. If the roots are ſuffered to remain in water all the year, they will not decay; but will flower again at their proper ſeaſon, and that as vigorouſly as thoſe which have been taken out and dried. The old fibres of thoſe roots never rot till they are ready to puſh forth new ones. It is found by experience, that the hyacinth, and many other plants, grow to a greater degree of perfection when thus in water, than when in the ground. There is a peculiar ſpecies of hyacinth called *Keyſer's jewel;* this never, or very rarely, produces ſeed-veſſels in the common way of flowering, in the ground; but it will often produce ſome pods when blown in water.

Mr Miller has intimated, in the Philoſophical Tranſactions, that bulbs ſet in glaſſes grow weaker, and ſhould be renewed every other year: but it is found, that, when managed in this manner, and kept under water, at the time of taking them up, they are as large, and ſome of them larger, than when planted; and if theſe be dried at a proper ſeaſon, they will flower, year after year, as well as freſh ones.

Ranunculus and anemone roots have been found to ſhoot up their ſtalks very well in this way; but the flowers are uſually blaſted, which ſeems to ariſe from want of free air. Pinks will flower very well in this manner; auriculas alſo may, with care, be brought to flower, but not ſtrongly. Roſes, jeſſamines, and honeyſuckles, may alſo be made to flower this way, and will thrive and ſend out ſuckers; the beſt pieces to plant, are ſuckers cut off about three inches under ground, without any fibres. The ſucculent plants may alſo be raiſed this way; for inſtance, the opuntia or Indian fig. If a fragment of a leaf of this plant be cut, and laid by to dry for a month till it is an abſolute ſkin, as ſoon as it is put in this manner into water, it begins to plump up, and ſoon ſends out fibrous roots, and produces new leaves as quickly as it would do in the ground.

This is the more ſingular in theſe ſort of plants, becauſe, in their natural ſtate in the ground, they cannot bear much water. This method of growing in water is not peculiar to the bulbous-rooted ones, but others may even be raiſed from ſeed by it. A bean, or pea, ſet in this manner, will grow up to its proper ſtandard, and will flower and produce pods which will ripen their ſeed. The ſmaller ſeeds may be alſo raiſed in this manner, by the help of wool to ſupport them.

No vegetable tranſplanted out of the earth into water will thrive kindly; but any plant, whether raiſed from the root or ſeed in water, may be tranſplanted to the earth, and will ſucceed very well. It may be poſſible, therefore, from this method of raiſing plants in water, to come at a better way than is uſually practiſed of raiſing ſome roots in the earth which are ſubject to rot there; ſuch as anemonies, ranunculus's, and hyacinths. A bulb dropped by chance upon the ground, will ſtrike out both ſtronger and more numerous fibres than thoſe which are planted in the uſual way in the ground. On this principle, it may be proper to take out the earth of the bed where the bulbs are to ſtand at the time of planting them, to ſuch a depth as they are to be placed under it when ſet for flowering. The bulbs are then to be ſet in their places, on the ſurface of this low ground; and to ſtand there till they have ſhot out their fibres and their head: then the earth is to be added over them by degrees, till they are covered as high above the head as they are in the uſual manner of planting them: thus they would be preſerved from the danger of rotting; and their fibres would be much ſtronger, and conſequently they would draw more nouriſhment, and flower better, than in the common way. The common method of planting theſe roots renders them liable to be deſtroyed by either extreme of a wet or a dry ſeaſon. In the firſt caſe, they immediately rot, by the abundant moiſture they receive; and, in the ſecond, they become dry as a ſtick, and mouldy; ſo that they are infallibly rotted by the firſt rain that falls afterwards.

The directions neceſſary to the ſucceſs of the bulbs planted in water are theſe. When the leaden falſe bottoms are fixed down tight within two or three inches of the bottom of the veſſel (which is only deſigned to hold the ſticks ſteady which are to ſupport the leaves and ſtalks), then lay on the lead upon which the bulbs are to reſt, placing the notched part oppoſite to that in the falſe bottom, as near as the ſticks, when placed, will ſuffer it; then place the bulbs one in each hole, and fill up with water to the upper lead. The bottom of the bulb will then touch the water; and as the water diminiſhes in quantity, keep it ſupplied with more up to the ſame height for a month or ſix weeks; in which time the bulbs will have ſhot ſtrong fibres. Then fill up the water about half an inch above the ſurface of the lead; and, by degrees, as the fibres ſtrengthen, and the plume ſhoots from the head, keep the water higher and higher, till at length the whole bulb is covered. The water is to be kept at this ſtandard till the ſeaſon for drying them returns.—At the time of planting the bulbs, they muſt be carefully cleaned from any foulneſſes at the bottom, by ſcraping them with the point of a knife till the ſound part of the bulb appears; clear them likewiſe from any looſe ſkins, and even take off their brown ſkin till they appear white; otherwiſe this brown ſkin will tinge the water, and the growth will not ſucceed ſo well.

The notches in the ſide of each lead are intended to give eaſy paſſage to the water, that, if there ſhould be any foulneſs or ſediment in it, on ſhaking it a little it may all run through, and freſh water be put in its place. But this ſhifting the water need not be done more than once or twice in a winter, as there may be occaſion from the foulneſs; and when this is done, the ſides of the veſſel ſhould be cleaned with a painter's bruſh, and rinſed out again, and the bulbs themſelves waſhed, by pouring water on them at a little diſtance.

At any time when the outer ſkins of the bulbs dry, they are to be peeled off, that they may not occaſion foulneſs in the water; and if any duſt or foul matter be at any time obſerved ſwimming on the ſurface, the method is to fill up the pot or veſſel to the rim, and let it run over: this will carry off that light foulneſs, and the water may afterwards be poured away to the proper ſtandard.

Bulbs of equal bigneſs ſhould be planted together in the ſame pot, that they may all have the ſame benefit of the water. Narciſſus's and hyacinths do well together; as alſo tulips and jonquils, and crocuſes and ſnow-drops.

FLUDD (Robert), a famous philoſopher, born in 1447. He was fellow of the college of phyſicians in London, and became a moſt voluminous writer: he doated greatly on the wonders of chemiſtry; was a zealous brother of the Roſicruſian order; and his books, which are moſtly in Latin, are as dark and myſterious in their language as in their matter. He died in 1657.

FLUDDER. See Colymbus.

FLUID, an appellation given to all bodies whoſe particles eaſily yield to the leaſt partial preſſure, or force impreſſed. For the

Laws and Properties of Fluids. See Hydrostatics.

There are various kinds of animalcules to be diſcerned in different fluids by the microſcope. Of many remarkable kinds of theſe, a deſcription is given under the article Animalcule. All of theſe little creatures are eaſily deſtroyed by ſeparating them from their natural element. Naturaliſts have even fallen upon ſhorter methods. A needle point, dipped in ſpirit of vitriol, and then immerſed into a drop of pepper-water, readily kills all the animalcules; which, though before friſking about with great livelineſs and activity, no ſooner come within the influence of the acid particles, than they ſpread themſelves, and tumble down to all appearance dead. The like may be done by a ſolution of ſalt; only with this difference, that, by the latter application, they ſeem to grow vertiginous, turning round and round, till they fall down. Tincture of ſalt of tartar, uſed in the ſame manner, kills them ſtill more readily; yet not ſo, but there will be apparent marks of their being firſt ſick and convulſed. Inks deſtroy them as faſt as ſpirit of vitriol, and human blood produces the ſame effect. Urine, ſack, and ſugar, all deſtroy them, though not ſo faſt; beſides, that there is ſome diverſity in their figures and appearances, as they receive their deaths from this poiſon or that. The point of a pin dipped in ſpittle, preſently killed all the kinds of animalcules in puddle-water, as Mr Harris ſuppoſes it will other animalcules of this kind.

All who are acquainted with microſcopic obſervations, know very well, that in water, in which the beſt glaſſes can diſcover no particle of animated matter, after a few grains of pepper, or a fragment of a plant of almoſt any kind, has been ſome time in it, animals full of life and motion are produced; and thoſe in ſuch numbers, as to equal the fluid itſelf in quantity.—When we ſee a numerous brood of young fiſhes in a pond, we make no doubt of their having owed their origin to the ſpawn, that is, to the eggs of the parents of the ſame ſpecies. What are we then to think of theſe? If we will conſider the progreſs of nature in the inſect-tribes in general, and eſpecially in ſuch of them as are moſt analogous to theſe, we ſhall find it leſs difficult to give an account of their origin than might have been imagined.

A ſmall quantity of water taken from any ditch in the ſummer-months, is found to be full of little worms, ſeeming in nothing ſo much as in ſize to differ from the microſcopic animalcules. Nay, water, without theſe, expoſed in open veſſels to the heat of the weather, will be always found to abound with multitudes of them, viſible to the naked eye, and full of life and motion. Theſe we know, by their future changes, are the fly-worms of the different ſpecies of gnats, and multitudes of other fly-ſpecies; and we can eaſily determine, that they have owed their origin only to the eggs of the parent-fly there depoſited. Nay, a cloſſer obſervation will at any time give ocular proof of this,

this; as the flies may be ſeen laying their eggs there, and the eggs may be followed through all their changes to the fly again. Why then are we to doubt but that the air abounds with other flies and animalcules as minute as the worms in thoſe fluids; and that theſe laſt are only the fly-worms of the former, which, after a proper time ſpent in that ſtate, will ſuffer changes like thoſe of the larger kinds, and become flies like thoſe to whoſe eggs they owed their origin? *Vid. Reaumur. Hiſt. Inſect.* vol. iv. p. 431.

The differently medicated liquors made by infuſions of different plants, afford a proper matter for the worms of different ſpecies of theſe ſmall flies: and there is no reaſon to doubt, but that among theſe ſome are viviparous, others oviparous; and to this may be, in a great meaſure, owing the different time taken up for the production of theſe inſects in different fluids. Thoſe which are a proper matter for the worms of the viviparous fly, may be ſooneſt found full of them; as, probably, the liquor is no ſooner in a ſtate to afford them proper nouriſhment, than their parents place them there: whereas thoſe produced from the eggs of the little oviparous flies, muſt, after the liquor is in a proper ſtate, and they are depoſited in it in the form of eggs, have a proper time to be hatched, before they can appear alive.

It is eaſy to prove, that the animals we find in theſe vegetable infuſions were brought thither from elſewhere. It is not leſs eaſy to prove, that they could not be in the matter infuſed any more than in the water in which it is infuſed.

Notwithſtanding the fabulous accounts of ſalamanders, it is now well known, that no animal, large or ſmall, can bear the force of fire for any conſiderable time; and, by parity of reaſon, we are not to believe, that any inſect, or embryo inſect, in any ſtate, can bear the heat of boiling water for many minutes. To proceed to inquiries on this foundation: If ſeveral tubes filled with water, with a ſmall quantity of vegetable matter, ſuch as pepper, oak-bark, truffles, &c. in which, after a time, inſects will be diſcovered by the microſcope; and other like tubes be filled with ſimple water boiled, with water and pepper boiled together, and with water with the two other ingredients, all ſeparately boiled in it; when all theſe liquors come to a proper time for the obſervation of the microſcope, all, as well thoſe which have been boiled, as thoſe which have not, will be found equally to abound with inſects; and thoſe of the ſame kind, in infuſions of the ſame kind, whether boiled or not boiled. Thoſe in the infuſions which had ſuſtained a heat capable of deſtroying animal-life, muſt therefore not have ſubſiſted either in the water, or in the matters put into it, but muſt have been brought thither after the boiling; and it ſeems by no way ſo probably, as by means of ſome little winged inhabitants of the air depoſiting their eggs or worms in theſe fluids.

On this it is natural to aſk, how it comes to paſs, that while we ſee myriads of the progeny of theſe winged inſects in water, we never ſee themſelves? The anſwer is equally eaſy, viz. becauſe we can always place a drop of this water immediately before the focus of the microſcope, and keep it there while we are at leiſure to examine its contents; but that is not the caſe with regard to the air inhabited by the parent-flies of theſe worms, which is an immenſe extent in proportion to the water proper for nouriſhing theſe worms; and conſequently, while the latter are cluſtered together in heaps, the former may be diſperſed and ſcattered. Nor do we want inſtances of this, even in inſects of a larger kind. In many of our gardens, we frequently find veſſels of water filled with worms of the gnat kind, as plentifully, in proportion to their ſize, as thoſe of other fluids are with animalcules. Every cubic inch of water in theſe veſſels contains many hundreds of animals; yet we ſee many cubic inches of air in the garden not affording one of the parent flies.

But neither are we poſitively to declare that the parent flies of theſe animalcules are in all ſtates wholly inviſible to us: if not ſingly to be ſeen, there are ſome ſtrong reaſons to imagine that they may in great cluſters. Every one has ſeen in a clear day, when looking ſtedfaſtly at the ſky, that the air is in many places diſturbed by motions and convolutions in certain ſpots. Theſe cannot be the effects of imagination, or of faults in our eyes, becauſe they appear the ſame to all; and if we conſider what would be the caſe to an eye formed in ſuch a manner as to ſee nothing ſmaller than an ox, on viewing the air on a marſh fully peopled with gnats, we muſt be ſenſible, that the clouds of theſe inſects, though to us diſtinctly enough viſible, would appear to ſuch an eye merely as the moving parcels of air in the former inſtance do to us: and ſurely it is thence no raſh concluſion to infer, that the caſe may be the ſame, and that myriads of flying inſects, too ſmall to be ſingly the objects of our view, yet are to us what the clouds of gnats would be in the former caſe.

Nervous FLUID. See NERVOUS *Fluid*.

Elaſtic FLUIDS. See AIR, GAS, VAPOUR, &c.

FLUIDITY, is by Sir Iſaac Newton defined to be, that property of bodies by which they yield to any force impreſſed, and which have their parts very eaſily moved among one another.

To this definition ſome have added, that the parts of a fluid are in a continual motion. This opinion is ſupported by the ſolution of ſalts, and the formation of tinctures. If a ſmall bit of ſaffron is thrown into a vial full of water, a yellow tincture will ſoon be communicated to the water to a conſiderable height tho' the vial is allowed to remain at reſt; which indicates a motion in thoſe parts of the fluid which touch the ſaffron, by which its colouring matter is carried up.

With regard to water, this can ſcarce be denied; the conſtant exhalations from its ſurface ſhew, that there muſt be a perpetual motion in its parts from the aſcent of the ſteam through it. In mercury, where inſenſible evaporation does not take place, it might be doubted; and accordingly the Newtonian philoſophers in general have been of opinion, that there are ſome ſubſtances eſſentially fluid, from the ſpherical figure of their conſtituent particles. The congelation of mercury, however, by an extreme degree of cold *, demonſtrates that fluidity is not eſſentially inherent in mercury more than in other bodies.

That fluids have vacuities in their ſubſtance is evident, becauſe they may he made to diſſolve certain bodies without ſenſibly increaſing their bulk. For example, water will diſſolve a certain quantity of ſalt;

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* See *Congelation*.

after which it will receive a little ſugar, and after that a little alum, without increaſing its firſt dimenſions. Here we can ſcarce ſuppoſe any thing elſe than that the ſaline particles were interpoſed between thoſe of the fluid; and as, by the mixture of ſalt and water, a conſiderable degree of cold is produced, we may thence eaſily ſee why the fluid receives theſe ſubſtances without any increaſe of bulk. All ſubſtances are expanded by heat, and reduced into leſs dimenſions by cold; therefore, if any ſubſtance is added to a fluid, which tends to make it cold, the expanſion by the bulk of the ſubſtance added, will not be ſo much perceived as if this effect had not happened; and if the quantity added be ſmall, the fluid will contract as much, perhaps more, from the cold produced by the mixture, than it will be expanded from the bulk of the ſalt. This alſo may let us know with what theſe interſtices between the particles of the fluid were filled up; namely, the element of fire, or heat. The ſaline particles, upon their ſolution in the fluid, have occupied theſe ſpaces; and now the liquor, being deprived of a quantity of this element equal in bulk to the ſalt added, feels ſenſibly colder.

As, therefore, there is ſcarce any body to be found, but what may become ſolid by a ſufficient degree of of cold; and none but what a certain degree of heat will render fluid; the opinion naturally ariſes, that fire is the cauſe of fluidity in all bodies, and that this element is the only eſſentially fluid ſubſtance in nature. Hence we may conclude, that thoſe ſubſtances which we call *fluids* are not eſſentially ſo, but only aſſume that appearance in conſequence of an intimate union with the element of fire; juſt as gums aſſume a fluid appearance on being diſſolved in ſpirit of wine, or ſalts in water.

Upon theſe principles Dr Black mentions fluidity as an effect of heat. The different degrees of heat which are required to bring different bodies into a ſtate of fluidity, he ſuppoſes to depend on ſome particulars in the mixture and compoſition of the bodies themſelves: which becomes extremely probable, from conſidering that we change the natural ſtate of bodies in this reſpect, by certain mixtures; thus, if two metals are compounded, the mixture is uſually more fuſible than either of them ſeparately. See CHEMISTRY, n° 56.

It is certain, however, that water becomes warmer by being converted into ice *; which may ſeem contradictory to this opinion. To this, however, the Doctor replies, that fluidity does not conſiſt in the degree of ſenſible heat contained in bodies, which will affect the hand, or a thermometer; but in a certain quantity which remains in a *latent* ſtate *. This opinion he ſupports from the great length of time required to melt ice; and to aſcertain the degree of heat requiſite to keep water in a fluid ſtate, he put 5 ounces of water into a Florence flaſk, and converted it into ice by means of a freezing mixture put round the flaſk. Into another flaſk of the ſame kind he put an equal quantity of water cooled down nearly to the freezing point, by mixing it with ſnow, and then pouring it off. In this he placed a very delicate thermometer; and found, that it acquired heat from the air of the room in which it was placed: ſeven degrees of heat were gained the firſt half-hour. The ice being expoſed to the ſame degree of heat, namely, the air of a large room without fire, it cannot be doubted that it received heat from the air as faſt as the water which was not frozen: but, to prevent all poſſibility of deception, he put his hand under the flaſk containing the ice, and found a ſtream of cold air very ſenſibly deſcending from it, even at a conſiderable diſtance from the flaſk; which undeniably proved, that the ice was all that time abſorbing heat from the air. Nevertheleſs, it was not till 11 hours, that the ice was half-melted, tho' in that time it had abſorbed ſo much heat as ought to have raiſed the thermometer to 140°; and even after it was melted, the temperature of the water was found ſcarce above the freezing point: ſo that, as the heat which entered could not be found in the melted ice, he concluded that it remained concealed in the water, as an eſſential ingredient of its compoſition *.

* See *Congelation.*

* See *Evaporation.*

* See *Congelation.*

FLUKE, or FLOUNDER, in ichthyology. See PLEURONECTES.

FLUMMERY, a wholeſome ſort of jelly made of oat-meal.

The manner of preparing it is as follows. Put three large handfuls of finely ground oat-meal to ſteep, for 24 hours, in two quarts of fair water: then pour off the clear water, and put two quarts of freſh water to it: ſtrain it thro' a fine hair-ſieve, putting in two ſpoonfuls of orange-flower water, and a ſpoonful of ſugar: boil it till it is as thick as a haſty-pudding, ſtirring it continually while it is boiling, that it may be very ſmooth.

FLUOR, in phyſics, a fluid; or, more properly, the ſtate of a body that was before hard or ſolid, but is now reduced by fuſion, or fire, into a ſtate of fluidity.

FLUOR, in mineralogy, a certain kind of ſtone which facilitates fuſion. They are of different colours, purple, green, yellow, &c. more or leſs tranſparent, which are commonly found in veins of ores, and ſerve as the matrix to the minerals which they invelope. Moſt of them affect a cubical form, but others are found in lumps which have no determinate ſhape. They may be diſtinguiſhed from other ſtones by the following properties.

1. They are not ſufficiently hard to ſtrike fire with ſteel. By this property they are diſtinguiſhed from the coloured quartz-cryſtals, called *falſe emeralds, falſe rubies*, &c. which names have alſo been improperly applied to the cubical coloured fluors.

2. They are not ſoluble by acids, and thus are diſtinguiſhable from calcareous ſpars.

3. When calcined without addition, and mixed with water, they do not form plaſter; and when calcined with addition of inflammable matter, they cannot be formed into the Bolognian phoſphorus. Hence they may be diſtinguiſhed from the gypſeous phoſphoric ſpars and ſtones.

4. They are fuſible by fire without addition, according to M. Engeſtrom and M. D'Arcet.

5. They greatly facilitate the fuſion of calcareous and argillaceous earths; and alſo of the topaz, according to Mr Pott. They are much employed in the ſmelting of ores, as they promote the fuſion of the adhering earths.

6. When expoſed to fire till they become red-hot, they emit ſome lucid rays in the dark: but their light

is very weak, and afterwards they crackle and break into ſmall pieces; whereas the gypſeous phoſphoric ſpars expoſed to the ſame heat emit a vivid light, and then break aſunder into pieces not ſo pulverable as thoſe of the heated fluors.

M. Margraaf has made experiments in order to diſcover the nature of theſe ſtones. He aſcertained the above-mentioned diſtinctions between them and the gypſeous ſpars; and therefore infers, that they are not compounded of vitriolic acid with calcareous earth. He obſerved ſingular appearances on mixing them with vitriolic and other acids, and ſubjecting the mixtures to diſtillation.

Eight ounces of the powder of a green fluor, being mixed with an equal weight of pure oil of vitriol, and diſtilled together with a graduated heat, yielded, after the watery part of the acid had paſſed, a fine white ſublimate, which aroſe and adhered to the neck of the retort, and even paſſed into the receiver. The firſt parts of this ſublimate which aroſe, appeared like butter of antimony; and, like this butter, they melted by the heat of a live coal, brought near the neck of the retort: but the parts which aroſe towards the end of the operation, with the greateſt degree of heat, could not be melted by that heat. The retort being broken, a reſiduum was found weighing 12 oz. Hence 4 oz. of oil of vitriol remained united with the ſpar. The bottom of the retort was obſerved to be pierced with holes. Laſtly, the liquor, which had paſſed into the receiver, and the white ſublimate, had very ſenſibly a ſulphureous ſmell. The ſublimate, triturated a long time in a mortar with hot diſtilled water, diſſolved, and paſſed thro' a filter. To the filtrated liquor ſome fixed alkali being added, a precipitate was formed; which being well waſhed and dried, was readily melted by fire into a maſs reſembling porcelain. The ſame excellent and accurate chemiſt produced the ſame effects upon this ſtone, by ſubſtituting, inſtead of the vitriolic acid, the nitrous, marine, phoſphoric, or the concentrated acetous acids.

FLUOR *Acid.* See CHEMISTRY, n° 263.

FLUOR *Albus*, or *Whites.* See (the *Index* ſubjoined to) MEDICINE.

FLUSHING, an handſome, ſtrong, and conſiderable town of the United Provinces, in Zeland, and in the iſland of Walcheren, with a very good harbour, and a great foreign trade. It was put into the hands of queen Elizabeth for a pledge of their fidelity, and as a ſecurity for the money ſhe advanced. It is one of the three places which Charles V. adviſed Philip II. to preſerve with care. E. Long. 3. 32. N. Lat. 51. 26.

FLUTE, an inſtrument of muſic, the ſimpleſt of all thoſe of the wind-kind. It is played on by blowing it with the mouth; and the tones or notes are changed by ſtopping and opening the holes diſpoſed for that purpoſe along its ſide.

This is a very ancient inſtrument. It was at firſt called the flute *à bec*, from *bec* an old Gauliſh word ſignifying the beak of a bird or fowl, but more eſpecially of a cock: the term *flute à bec* muſt therefore ſignify the *beaked flute*; which appears very proper, on comparing it with the traverſe or German flute. The word *flute* is derived from *fluta*, the Latin for a lamprey or ſmall eel taken in the Sicilian ſeas, having ſeven holes immediately below the gills on each ſide, the preciſe number of thoſe in the front of the flute.

By Merſennus this inſtrument is called the *fiſtula dulcis, ſeu Anglica*; the loweſt note, according to him, for the treble flute, is *C fa ut*, and the compaſs of the inſtrument 15 notes. There is, however, a flute known by the name of the *concert-flute*, the loweſt note of which is F. Indeed, ever ſince the introduction of the flute into concerts, the loweſt note of the inſtrument, of what ſize ſoever it is, has been called F; when in truth its pitch is determinable only by its correſpondence in reſpect of acuteneſs or gravity with one or other of the chords in the *ſcala maxima* or great ſyſtem.

Beſides the true concert-flute, others of a leſs ſize were ſoon introduced into concerts of violins; in which caſe the method was to write the flute-part in a key correſpondent to its pitch. This practice was introduced in 1710 by one Woodcock, a celebrated performer on this inſtrument, and William Babell organiſt of the church of All-hallows, Bread-Street, London. They failed, however, in procuring for the flute a reception into concerts of various inſtruments; for which reaſon, one Thomas Staneſby, a very curious maker of flutes and other inſtruments of the like kind, about the year 1732, adverting to the ſcale of Merſennus, in which the loweſt note was C, invented what he called the *new ſyſtem*; in which, by making the flute of ſuch a ſize as to be a fifth above concert-pitch, the loweſt note became *C ſol fa ut*. By this contrivance the neceſſity of tranſpoſing the flute-part was taken away; for a flute of this ſize, adjuſted to the ſyſtem above-mentioned, bebecame an octave to the violin. To further this invention of Staneſby, one Lewis Merci, an excellent performer on the flute, publiſhed, about the year 1735, ſix ſolos for this inſtrument, three of which are ſaid to be accommodated to Mr Staneſby's new ſyſtem; but the German flute was now become a favourite inſtrument, and Staneſby's ingenuity failed of its effect.—One great objection indeed lies againſt this inſtrument, which, however, equally affects all perforated pipes; namely, that they are never perfectly in tune, or cannot be made to play all their notes with equal exactneſs. The utmoſt that the makers of them can do is to tune them to ſome one key; as the hautboy to C, the German flute to D, and the Engliſh flute to F, and to effect this truly is a matter of no ſmall difficulty. The Engliſh flutes made by the younger Staneſby come the neareſt of any to perfection; but thoſe of Breſſan, though excellent in their tone, are all too flat in the upper octave. For theſe reaſons ſome are induced to think, that the utmoſt degree of proficiency on any of thoſe inſtruments is not worth the labour of attaining it.

German FLUTE, is an inſtrument entirely different from the common flute. It is not, like that, put into the mouth to be played; but the end is ſtopt with a tompion or plug, and the lower lip is applied to a hole about two inches and a half or three inches diſtant from the end. This inſtrument is uſually about a foot and a half long; rather bigger at the upper end than the lower; and perforated with holes, beſides that for the mouth, the loweſt of which is ſtopped and opened by the little finger's preſſing on a braſs or ſometimes a ſilver key, like thoſe in hautboys, baſſoons, &c.

Its ſound is exceeding ſweet and agreeable ; and ſerves as a treble in a concert.

FLUX, in metallurgy, is ſometimes uſed ſynonimouſly with *fuſion*. For inſtance, an ore, or other matter, is ſaid to be in liquid flux, when it is completely fuſed.

But the word *flux* is generally uſed to ſignify certain ſaline matters, which facilitates the fuſion of ores, and other matters which are difficultly fuſible in eſſays and reductions of ores. Fixed alkalis, nitre, borax, tartar, and common ſalt, are the ſaline matters of which fluxes are generally compoſed. But the word *flux* is more particularly applied to mixtures of different proportions of only nitre and tartar ; and theſe fluxes are called by particular names, according to the proportions of theſe ingredients, as in the following articles.

White **Flux**, is made with equal parts of nitre and of tartar detonated together, by which they are alkaliſed. The reſiduum of this detonation is an alkali compoſed of the alkalis of the nitre and of the tartar, both which are abſolutely of the ſame nature. As the proportion of nitre in this mixture is more than is ſufficient to conſume entirely all the inflammable matter of the tartar, the alkali remaining after the detonation is perfectly white, and is therefore called *white flux ;* and as this alkali is made very quickly, it is alſo called *extemporaneous alkali*. When a ſmall quantity only of white flux is made, as a few ounces for inſtance, ſome nitre always remains undecompoſed, and a little of the inflammable principle of the tartar, which gives a red or even a black colour to ſome part of the flux : but this does not happen when a large quantity of white is made flux ; becauſe then the heat is much greater. This ſmall quantity of undecompoſed nitre and tartar which remains in white flux is not hurtful in moſt of the metallic fuſions in which this flux is employed : but if the flux be required perfectly pure, it might eaſily be diſengaged from thoſe extraneous matters by a long and ſtrong calcination, without fuſion.

Crude **Flux**. By crude flux is meant the mixture of nitre and tartar in any proportions, without detonation. Thus the mixture of equal parts of the two ſalts uſed in the preparation of the white flux, or the mixture of one part of nitre and two parts of tartar for the preparation of the black flux, are each of them a crude flux before detonation. It has alſo been called *white flux*, from its colour; but this might occaſion it to be confounded with the white flux above deſcribed. The name, therefore, of crude flux is more convenient.

Crude flux is detonated and alkaliſed during the reductions and fuſions in which it is employed ; and is then changed into white or black flux, according to the proportions of which it is compoſed. This detonation produces good effects in theſe fuſions and reductions, if the ſwelling and extravaſation of the detonating matters be guarded againſt. Accordingly, crude flux may be employed ſucceſsfully in many operations ; as, for inſtance, in the ordinary operation for procuring the regulus of antimony.

Black **Flux**. Black flux is produced from the mixture of two parts of tartar and one part of nitre detonated together. As the quantity of nitre which enters into the compoſition of this flux is not ſufficient to conſume all the inflammable matter of the tartar, the alkali which remains after the detonation contains much black matter, of the nature of coal, and is therefore called *black flux*.

This flux is deſignedly ſo prepared, that it ſhall contain a certain quantity of inflammable matter ; for it is thereby capable, not only of facilitating the fuſion of metallic earths like the white flux, but alſo of reviving theſe metals by its phlogiſton. From this property it is alſo called *reducing flux ;* the black flux, therefore, or crude flux made with ſuch proportions of the ingredients as to be convertible into black flux, ought always to be uſed when metallic matters are at once to be fuſed and reduced, or even when deſtructive metals are to be fuſed, as theſe require a continual ſupply of phlogiſton to prevent their calcination.

FLUXIONS;

A Method of calculation which greatly facilitates computations in the higher parts of mathematics. Sir Iſaac Newton and Mr Leibnitz contended for the honour of inventing it. It is probable they had both made progreſs in the ſame diſcovery, unknown to each other, before there was any publication on the ſubject.

In this branch of mathematics, magnitudes of every kind are ſuppoſed generated by motion ; a line by the motion of a point, a ſurface by the motion of a line, and a ſolid by the motion of a ſurface. And ſome part of a figure is ſuppoſed generated by an uniform motion ; in conſequence of which, the other parts may increaſe uniformly or with an accelerated or retarded motion, or may decreaſe in any of theſe ways ; and the computations are made by tracing the comparative velocities with which the parts flow.

Fig. 1. If the parallelogram ABCD be generated by an uniform motion of the line AB toward CD while it moves from FE towards *fe*, while the line BF receives the increment F*f*, and the figure will be increaſed by the parallelogram F*e*; the line FE in this caſe undergoes no variation.

The fluxion of any magnitude at any point is the increment that it would receive in any given time, ſuppoſing it to increaſe uniformly from that point; and as the meaſures will be the ſame, whatever the time be, we are at liberty to ſuppoſe it leſs than any aſſigned time.

The firſt letters in the alphabet are uſed to repreſent invariable quantities; the letters x, y, z, variable quantities; and the ſame letters with points over them $\dot{x}$, $\dot{y}$, $\dot{z}$, repreſent their fluxions.

Therefore if AB$=a$, and BF$=x$; F*f*, the fluxion of BF, will be $=x$, and F*e*, the fluxion of AF, $=ax$.

If the rectangle be ſuppoſed generated by the uniform motion of FG towards CD, at the ſame time that HG moves uniformly towards AD, the point G keeping always on the diagonal, the lines FG HG will flow uniformly; for while B*f* receives the increment F*f*, and HB the increment HK, FG will receive the increment

ment *hg*, and HG the increment *hg*, and they will receive equal increments in equal ſucceſſive times. But the parallelogram will flow with an accelerated motion; for while F flows to *f*, and H to K, it is increaſed by the gnomon KG*f*; but while F and H flow through the equal ſpaces *fm* KL, it is increaſed by the gnomon L*gm* greater than KG*f*; conſequently when fluxions of the ſides of a parallelogram are uniform, the fluxion of the parallelogram increaſes continually.

The fluxion of the parallelogram BHGF is the two parallelograms KG and G*f*; for though the parameter receives an increment of the gnomon KG*f*, while its ſides flow to *f* and K, the part *g*G is owing to the additional velocity wherewith the parallelogram flows during that time; and therefore is no part of the meaſure of the fluxion, which muſt be computed by ſuppoſing the parameter to flow uniformly as it did at the beginning, without any acceleration.

Therefore if the ſides of a parallelogram be x and y, their fluxions will be $\dot{x}\ \dot{y}$; and the fluxion of the parallelogram $x\dot{y}+y\dot{x}$; and if $x=y$, that is, if the figure be a ſquare, the fluxion of x^2 will be $2x\dot{x}$.

Fig. 2. Let the triangle ABC be deſcribed by the uniform motion of DE from A towards B, the point E moving in the line DF, ſo as always to touch the lines AC, CB; while D moves from A to F, DE is uniformly increaſed, and the increaſe of the triangle is uniformly accelerated. When DE is in the poſition FC, it is a maximum. As D moves from F to B, the line FC decreaſes, and the triangle increaſes, but with a motion uniformly retarded.

Fig. 3. If the ſemicircle AFB be generated by the uniform motion of CD from A towards B, while C moves from A to G, the line CD will increaſe, but with a retarded motion; the circumference alſo increaſes with a retarded motion, and the circular ſpace increaſes with an accelerated motion, but not uniformly, the degrees of acceleration growing leſs as CD approaches to to the poſition GF. When C moves from G to B, it decreaſes with a motion continually accelerated, the circumference increaſes with a motion continually accelerated, and the area increaſes with a motion continually retarded, and more quickly retarded as CD approaches to B.

The fluxion of a quantity which decreaſes is to be conſidered as negative.

When a quantity does not flow uniformly, its fluxion may be repreſented by a variable quantity, or a line of a variable length; the fluxion of ſuch a line is called the *ſecond fluxion of the quantity whoſe fluxion that line is:* and if it be variable, a third fluxion may be deduced from it, and higher orders from theſe in the ſame manner: the ſecond fluxion is repreſented by two points, as $\ddot{x}$.

The increment a quantity receives by flowing for any given time, contains meaſures of all the different orders of fluxions; for if it increaſes uniformly, the whole increment is the firſt fluxion; and it has no ſecond fluxion. If it increaſes with a motion uniformly accelerated, the part of the increment occaſioned by the firſt motion meaſures the firſt fluxion, and the part occaſioned by the acceleration meaſures the ſecond fluxion. If the motion be not only accelerated, but the degree of acceleration continually increaſed, the two firſt fluxions are meaſured as before; and the part of the increment occaſioned by the additional degree of acceleration meaſures the third; and ſo on. Theſe meaſures require to be corrected, and are only mentioned here to illuſtrate the ſubject.

DIRECT METHOD.

Any flowing quantity being given, to find its fluxion.

RULE I. To find the fluxion of any power of a quantity, multiply the fluxion of the root by the exponent of the power, and the product by a power of the ſame root leſs by unity than the given exponent.

The fluxion of x^3 is $3x^2x$, of x^n $nx^{n-1}\dot{x}$; for the root of x^n is x, whoſe fluxion is $\dot{x}$; which multiplied by the exponent n, and by a power of x leſs by unity than n, gives the above fluxion.

If x receive the increment $\dot{x}$, it becomes $x+\dot{x}$; raiſe both to the power of n, and x^n becomes $x^n+nx^{n-1}\dot{x}+\frac{n.\overline{n-1}}{2}x^{n-2}x^2+$, &c.; but all the parts of the increment, except the firſt term, are owing to the accelerated increaſe of x^n, and form meaſures of the higher fluxions. The firſt term only meaſures the firſt fluxion; the fluxion of $\overline{a^2+z^2}|^{\frac{3}{2}}$ is $\frac{3}{2}\times 2z\dot{z}\times\overline{a^2+z^2}|^{\frac{1}{2}}$; for put $x=a^2+z^2$, we have $\dot{x}=2z\dot{z}$; and the fluxion of $x^{\frac{3}{2}}$, which is equal to the propoſed fluent, is $\frac{3}{2}x^{\frac{1}{2}}\dot{x}$; for which ſubſtituting the values of z and x, we have the above fluxion.

RULE II. To find the fluxion of the product of ſeveral variable quantities multiplied together, multiply the fluxion of each by the product of the reſt of the quantities, and the ſum of the products thus ariſing will be the fluxion ſought.

Thus the fluxion of xy, is $\dot{x}y+\dot{y}x$; that of xyz, is $\dot{x}yz+\dot{x}zy+\dot{y}zx$; and that of $xyzu$, is $xyz\dot{u}+xyu\dot{z}+xzu\dot{y}+yzu\dot{x}$.

RULE III. To find the fluxion of a fraction.— From the fluxion of the numerator multiplied by the denominator, ſubtract the fluxion of the denominator multiplied by the numerator, and divide the remainder by the ſquare of the denominator.

Thus, the fluxion of $\frac{x}{y}$ is $\frac{y\dot{x}-x\dot{y}}{y^2}$; that of $\frac{x}{x+y}$, is $\frac{\dot{x}\times\overline{x+y}-\overline{\dot{x}+\dot{y}}\times x}{\overline{x+y}|^2}=\frac{y\dot{x}-x\dot{y}}{\overline{x+y}|^2}$.

RULE IV. In complex caſes, let the particulars be collected from the ſimple rules, and combined together.

The fluxion of $\frac{x^2y^2}{z}$ is $\frac{\overline{2x^2y\dot{y}+2y^2x\dot{x}}\times z-x^2y^2z}{z^2}$; for the fluxion of x^2 is $2x\dot{x}$, and of y^2 is $2y\dot{y}$, by Rule I. and therefore the fluxion of x^2y^2 (by Rule II.) $2x^2y\dot{y}+2y^2x\dot{x}$; from which, multiplied by z, (by Rule III.) and ſubtracting from it the fluxion of the denominator z, multiplied by the numerator, and dividing the whole by the ſquare of the denominator, gives the above fluxion.

RULE IV. The ſecond fluxion is derived from the firſt, in the ſame manner as the firſt from the flowing quantity.

Thus the fluxion of x^3, $3x^2\dot{x}$; its ſecond, $6x\dot{x}^2+3x^2\dot{x}$ (by Rule II.); and ſo on: but if $\dot{x}$ be invariable, $\ddot{x}=0$, and the ſecond fluxion of $x^3=6x\dot{x}^2$.

Prob. I. *To determine maxima and minima.*

When a quantity increaſes, its fluxion is poſitive; when it decreaſes, it is negative; therefore, when it is juſt betwixt increaſing and decreaſing, its fluxion is $=0$.

Rule. Find the fluxion, make it $=0$, whence an equation will reſult that will give an anſwer to the queſtion.

Examp. To determine the dimenſions of a cylindric meaſure ABCD, (fig. 4.) open at the top, which ſhall contain a given quantity (of liquor, grain, &c.) under the leaſt internal ſuperficies poſſible.

Let the diameter $AB=x$, and the altitude $AD=y$; moreover, let p (3,14159, &c.) denote the periphery of the circle whoſe diameter is unity, and let c be the given content of the cylinder. Then it will be $1 : p :: x : (px)$ the circumference of the baſe; which, multiplied by the altitude y, gives pxy for the concave ſuperficies of the cylinder. In like manner, the area of the baſe, by multiplying the ſame expreſſion into $\frac{1}{4}$ of the diameter x, will be found $=\frac{px^2}{4}$; which drawn into the altitude y, gives $\frac{px^2y}{4}$ for the ſolid content of the cylinder; which being made $=c$, the concave ſurface pxy will be found $=\frac{4c}{x}$, and conſequently the whole ſurface $=\frac{4c}{x}+\frac{px^2}{4}$: Whereof the fluxion, which is $-\frac{4c\dot{x}}{x^2}+\frac{px\dot{x}}{2}$ being put $=0$, we ſhall get $-8c\times px^3=0$; and therefore $x=2\sqrt[3]{\frac{c}{p}}$: further, becauſe $px^3=8c$, and $px^2y=4c$, it follows, that $x=2y$; whence y is alſo known, and from which it appears that the diameter of the baſe muſt be juſt the double of the altitude.

Fig. 7. To find the longeſt and ſhorteſt ordinates of any curve, DEF, whoſe equation or the relation which the ordinates bear to the abſciſſas is known.

Make AC the abſciſſa x, and CE the ordinate $=y$; take a value y in terms of x, and find its fluxion; which making $=0$, an equation will reſult whoſe roots give the value of x when y is a maximum or a minimum.

To determine when it is a maximum and when a minimum, take the value of y, when x is a little more than the root of the equation ſo found, and it may be perceived whether it increaſes or decreaſes.

If the equation has an even number of equal roots, y will be neither a maximum nor minimum when its fluxion is $=0$.

Prob. II. *To draw a tangent to any curve.*

Fig. 5. When the abſciſſa CS of a curve moves uniformly from A to B, the motion of the curve will be retarded if it be concave, and accelerated if convex towards AB; for a ſtraight line TC is deſcribed by an uniform motion, and the fluxion of the curve at any point is the ſame as the fluxion of the tangent, becauſe it would deſcribe the tangent if it continued to move equally from that point. Now if S*s* or C*e* be the fluxion of the baſe, C*d* will be the fluxion of the tangent, and *de* of the ordinate. And becauſe the triangles TSC, C*ed*, are equiangular, $de : ce ::$ CS : ST, wherefore,

Rule. Find a fourth proportional to the fluxion of the ordinate valued in terms of the abſciſſa, the fluxion of the abſciſſa, and the ordinate, and it determines the line ST, which is called the *ſemi-tangent*, and TC joined is a tangent to the curve.

Examp. To draw a right line CT, (fig. 6.) to touch a given circle BCA in a given point C.

Let CS be perpendicular to the diameter AB, and put $AB=a$, $BS=x$, and $SC=y$: then, by the property of the circle, y^2 (CS^2) $=BS\times AS$ $(=x\times\overline{a-x})$ $=ax-x^2$; whereof the fluxion being taken, in order to determine the ratio of $\dot{x}$ and $\dot{y}$, we get $2y\dot{y}=a\dot{x}-2x\dot{x}$; conſequently $\frac{\dot{x}}{\dot{y}}=\frac{2y}{a-2x}=\frac{y}{\frac{1}{2}a-x}$; which multiplied by y, gives $\frac{y\dot{x}}{\dot{y}}$ $=\frac{y^2}{\frac{1}{2}a-x}=$ the ſubtangent ST. Whence (O being ſuppoſed the centre) we have OS $(\frac{1}{2}a-x)$: CS (y) :: CS (y) : ST; which we alſo know from other principles.

Prob. III. *To determine points of contrary flexure in curves.*

Fig. 7. Suppoſing C to move uniformly from A to B, the curve DEF will be convex towards AB when the celerity of E increaſes, and concave when it decreaſes; therefore at the point where it ceaſes to be convex and begins to be concave, or the oppoſite way, the celerity of E will be uniform, that is, CE will have no ſecond fluxion. Therefore,

Rule. Find the ſecond fluxion of the ordinate in terms of the abſciſſa, and make it $=0$; and from the equation that ariſes you get a value of the abſciſſa, which determines the point of contrary flexure.

Ex. Let the nature of the curve ARS be defined by the equation $ay=a^{\frac{3}{2}}x^{\frac{1}{2}}+xx$, (the abſciſſa AF and the ordinate FG being, as uſual, repreſented by x and y reſpectively). Then $\dot{y}$, expreſſing the celerity of the point r, in the line FH, will be equal to $\frac{\frac{1}{2}a^{\frac{3}{2}}x^{-\frac{1}{2}}\dot{x}+2x\dot{x}}{a}$: Whoſe fluxion, or that of $\frac{1}{2}a^{\frac{3}{2}}x^{-\frac{1}{2}}+2x$ (becauſe a and $\dot{x}$ are conſtant) muſt be equal to nothing; that is, $-\frac{1}{4}a^{\frac{3}{2}}x^{-\frac{3}{2}}\dot{x}+2\dot{x}=0$: Whence $a^{\frac{3}{2}}x^{-\frac{3}{2}}=8$, $a^{\frac{3}{2}}=8x^{\frac{3}{2}}$, $64x^3=a^3$, and $x=\frac{1}{4}a=AF$; therefore FG $\left(=\frac{a^{\frac{3}{2}}x^{\frac{1}{2}}+xx}{a}\right)$ $=\frac{9}{16}a$: From which the poſition of the point G is given.

Prob. IV. *To find the radii of curvature.*

The curvature of a circle is uniform in every point, that of every other curve continually varying: and it is meaſured at any point by that of a circle whoſe radius is of ſuch a length as to coincide with it in curvature in that point.

All curves that have the ſame tangent have the ſame firſt fluxion, becauſe the fluxion of a curve and its tangent are the ſame. If it moved uniformly on from the point of contact, it would deſcribe the tangent. And the deflection from the tangent is owing to the acceleration or retardation of its motion, which is meaſured by its ſecond fluxion: and conſequently two curves which have not only the ſame tangent, but the ſame curvature at the point of contact, will have both their firſt and ſecond fluxions equal. It is eaſily proven from thence, that the radius of curvature is $=\frac{\dot{z}^3}{-\dot{x}\ddot{y}}$, x, y, and z repreſent the abſciſſa, ordinate, and curve reſpectively.

Examp. Let the given curve be the common parabola, whoſe equation is $y=a^{\frac{1}{2}}x^{\frac{1}{2}}$: Then will $\dot{y}=\frac{1}{2}a^{\frac{1}{2}}\dot{x}x^{-\frac{1}{2}}=\frac{a^{\frac{1}{2}}\dot{x}}{2x^{\frac{1}{2}}}$, and (making $\dot{x}$ constant) $\ddot{y}-=\frac{1}{2}\times\frac{1}{2}a^{\frac{1}{2}}\dot{x}^2x^{-\frac{3}{2}}=\frac{-a^{\frac{1}{2}}\dot{x}^2}{4x^{\frac{3}{2}}}$: Whence $\dot{z}\ (\sqrt{\dot{x}^2+\dot{y}^2})=\frac{\dot{x}}{2}\sqrt{\frac{4x+a}{x}}$, and the radius of curvature $\left(\frac{\dot{z}3}{-\dot{x}\ddot{y}}\right)=\frac{\overline{a+4}|^{\frac{3}{2}}}{2\sqrt{a}}$: Which at the vertex, where $x=0$, will be $=\frac{1}{2}a$.

INVERSE METHOD.

From a given fluxion to find a fluent.

This is done by tracing back the ſteps of the direct method. The fluxion of x is $\dot{x}$; and therefore the fluent of $\dot{x}$ is x: but as there is no direct method of finding fluents, this branch of the art is imperfect. We can aſſign the fluxion of every fluent; but we cannot aſſign the fluent of a fluxion, unleſs it be ſuch a one as may be produced by ſome rule in the direct method from a known fluent.

General Rule. Divide by the fluxion of the root, add unity to the exponent of the power, and divide by the exponent ſo increaſed.

For, dividing the fluxion $nx^{n-1}\dot{x}$ by $\dot{x}$ (the fluxion of the root x) it becomes nx^{n-1}; and, adding 1 to the exponent $(n-1)$ we have nx^n; which, divided by n, gives x^n, the true fluent of $nx^{n-1}\dot{x}$.

Hence (by the ſame rule) the

Fluent of $3x^2\dot{x}$ will be $=x^3$;

That of $8x^2\dot{x}=\frac{8x^3}{3}$;

That of $2x^5\dot{x}=\frac{x^6}{3}$;

That of $y^{\frac{1}{2}}\dot{y}=\frac{2}{3}y^{\frac{3}{2}}$.

Sometimes the fluent ſo found requires to be corrected. The fluxion of x is $\dot{x}$, and the fluxion of $a+x$ is alſo $\dot{x}$, becauſe a is invariable, and has therefore no fluxion.

Now when the fluent of $\dot{x}$ is required, it muſt be determined, from the nature of the problem, whether any invariable part, as a, muſt be added to the variable part x.'

When fluents cannot be exactly found, they can be approximated by infinite ſeries.

Ex. Let it be required to approximate the fluent of $\frac{\overline{a^2-x^2}|^{\frac{1}{2}}\times x^n\dot{x}}{\overline{c^4-x^2}|^{\frac{1}{2}}}$ in an infinite ſeries.

The value of $\frac{\overline{a^2-x^2}|^{\frac{1}{2}}}{\overline{c^2-x^2}|^{\frac{1}{2}}}$, expreſſed in a ſeries, is

$$\frac{a}{c}+\overline{\frac{a}{2c^3}-\frac{1}{2ac}}\times x^2+\overline{\frac{3a}{8c^5}-\frac{1}{4ac^3}-\frac{1}{8a^3c}}\times x^4+\overline{\frac{5a}{16c^7}-\frac{3}{16ac}-\frac{1}{16a^3c^3}-\frac{1}{16a^5c}}\times x^6+\&c.$$

Which value being therefore multiplied by $x^n\dot{x}$, and the fluent taken (by the common method) we get

$$\frac{ax^{n+1}}{n+1\times c}+\overline{\frac{a}{2c^3}-\frac{1}{2ac}}\times\frac{x^{n+3}}{n+3}+\overline{\frac{3a}{8c^5}-\frac{1}{4ac^3}-\frac{1}{8a^3c}}\times\frac{x^{n+5}}{n+5}+\overline{\frac{5a}{16c^7}-\frac{3}{16ac^5}-\frac{1}{16a^3c^3}-\frac{1}{16a^5c}}\times\frac{x^{n+7}}{n+7}+\&c.$$

Prob. 1. *To find the area of any curve.*

Rule. Multiply the ordinate by the fluxion of the abſciſſa, and the product gives the fluxion of the figure, whoſe fluent is the area of the figure.

Examp. 1. Fig. 8. Let the curve ARMH, whoſe area you will find, be the common parabola. Let u repreſent the area, and $\dot{u}$ its fluxion.

In which caſe the relation of AB (x) and BR (y) being expreſſed by $y^2=ax$ where a is the parameter) we thence get $y=a^{\frac{1}{2}}x^{\frac{1}{2}}$; and therefore $\dot{u}=\text{R}m\text{HB}\ (=y\dot{x})$ $=a^{\frac{1}{2}}x^{\frac{1}{2}}\dot{x}$: whence $u=\frac{2}{3}\times a^{\frac{1}{2}}x^{\frac{2}{3}}=\frac{2}{3}a^{\frac{1}{2}}x^{\frac{1}{2}}\times x=\frac{2}{3}yx$ (becauſe $a^{\frac{1}{2}}x^{\frac{1}{2}}=y$) $=\frac{2}{3}\times$ AB $\times$ BR: hence a parabola is $\frac{2}{3}$ of a rectangle of the ſame baſe and altitude.

Examp. 2. Let the propoſed curve CSDR (fig. 9.) be of ſuch a nature, that (ſuppoſing AB unity) the ſum of the areas CSTBC and CDGBC anſwering to any two propoſed abſciſſas AT and AG, ſhall be equal to the area CRNBC, whoſe correſponding abſciſſa AN is equal to AT×AG, the product of the meaſures of the two former abſciſſas.

Firſt, in order to determine the equation of the curve, (which muſt be known before the area can be found), let the ordinates GD and NR move parallel to themſelves towards HF; and then having put GD$=y$, NR$=z$, AT$=a$, AG$=s$, and AN$=u$, the fluxion of the area CDGB will be repreſented by $y\dot{s}$, and that of the area CRNB by $z\dot{u}$: which two expreſſions muſt, by the nature of the problem, be equal to each other; becauſe the latter area CRNB exceeds the former CDGB by the area CSTB, which is here conſidered as a conſtant quantity: and it is evident, that two expreſſions, that differ only by a conſtant quantity, muſt always have equal fluxions.

Since, therefore, $y\dot{s}$ is $=z\dot{u}$, and $u=as$, by hypotheſis, it follows, that $\dot{u}=a\dot{s}$, and that the firſt equation (by ſubſtituting for $\dot{u}$) will become $y\dot{s}=az\dot{s}$, or $y=az$, or laſtly $ys=zas$, that is, GD×AG=NR×AN: therefore,

fore, GD : NR :: AN : AG; whence it appears, that every ordinate of the curve is reciprocally as its correſponding abſciſſa.

Now, to find the area of the curve ſo determined, put AB=1, BC=b, and BG=x: then, ſince AG $(1+x)$: AB (1) :: BC (b) : GD (y) we have $y=\frac{b}{1+x}$, conſequently $\dot{u}\ (=y\dot{x})=\frac{b\dot{x}}{1+x}=b\times\overline{\dot{x}-x\dot{x}+x^2\dot{x}-n^3\dot{x}+x\dot{x}^4}$ — &c. Whence, BGDC, the area itſelf will be $=b\times x-\frac{x^2}{2}+\frac{x^3}{3}-\frac{x^4}{4}+\frac{x^5}{5}$, &c. which was to be found.

Hence it appears, that as theſe areas have the ſame properties as logarithms, this ſeries gives an eaſy method of computing logarithms; and the fluent may be found by means of a table of logarithms, without the trouble of an infinite ſeries: and every fluxion whoſe fluent agrees with any known logarithmic expreſſion, may be found the ſame way. Hence the fluents of fluxions of the following forms are deduced.

The fluent of $\frac{\dot{x}}{\sqrt{x^2\pm a^2}}$ = hyp. log. of $x+\sqrt{x^2\pm a^2}$;

of $\frac{\dot{x}}{\sqrt{2ax+xx}}$ = hyp. log. $a\times x+\sqrt{2ax+x^2}$;

of $\frac{2a\dot{x}}{a^2-x^2}$ hyp. log. of $\frac{a+x}{a-x}$;

and of $\frac{2a\dot{x}}{x\sqrt{a^2\pm x^2}}$ = hyp. log. $\frac{a-\sqrt{a^2\pm x^2}}{a+\sqrt{a^2\pm x^2}}$

Prob. 2. *To determine the length of curves.*

Fig. 5. Becauſe Cde is a right-angled triangle, Cd^2 =Ce^2+de^2; wherefore the fluxions of the abſciſſa and ordinate being taken in the ſame terms and ſquared, their ſum gives the ſquare of the fluxion of the curve; whoſe root being extracted, and the fluent taken, gives the length of the curve.

Examp. To find the length of a circle from its tangent. Make the radius AO (fig. 5.) $=a$, the tangent of AC $=t$, and its ſecant $=s$, the curve $=z$, and its fluxion $=\dot{z}$; becauſe the triangles OTC, OCS, are ſimilar, OT : OC :: OC :: OS; whence OS $=\frac{a^2}{s}$, and SA $=a-\frac{a^2}{s}=a-\frac{a^2}{\sqrt{a^2+t^2}}$; whoſe fluxion is $\frac{a^2t\dot{t}}{\overline{a^2+t^2}|^{\frac{3}{2}}}$; and becauſe the triangles OTC, dCe are ſimilar, TC $(=t)$: TO $(=\sqrt{a^2+t^2})$ :: Ce $=\left(\frac{a^2t\dot{t}}{\overline{a^2+t^2}|^{\frac{3}{2}}}\right)$: Cd $=\frac{a^2\dot{t}}{a^2+t^2}$ = fluxion of the curve. Now by converting this into an infinite ſeries, we have the fluxion of the curve $=\dot{t}-\frac{t^2\dot{t}}{a^2}+\frac{t^4\dot{t}}{a^4}-\frac{t^6\dot{t}}{a^6}$, &c. and conſequently $z=-\frac{t^3}{3a^2}+\frac{t^5}{5a^4}-\frac{t^7}{7a^6}+\frac{t^9}{9a^8}$, &c. = AR. Where, if (for example' ſake) AR be ſuppoſed an arch of 30 degrees, and AO (to render the operation more eaſy) be put = unity, we ſhall have $t=\sqrt{\frac{1}{3}}=.5773502$ (becauſe O$b\sqrt{\frac{3}{4}}$: bR $(\frac{1}{2})$ :: OA (1) : AT $(t)=\sqrt{\frac{1}{3}}$) Whence,

$t^3 \quad (=t\times t^2=t\times\tfrac{1}{3})=.1924500$

$t^5 \quad \left(=t^3\times t^2=\frac{t^3}{3}\right)=.0641500$

$t^7 \quad \left(=t^5\times t^2=\frac{t^5}{3}\right)=.0213833$

$t^9 \quad \left(=t^7\times t^2=\frac{t^7}{3}\right)=.0071277$

$t^{11} \quad \left(=t^9\times t^2=\frac{t^9}{3}\right)=.0023759$

$t^{13} \quad \left(=t^{11}\times t^2=\frac{t^{11}}{3}\right)=.0007919$

$t^{15} \quad \left(=t^{13}\times t^2=\frac{t^{13}}{3}\right)=.0002639$

&c.

And therefore AR $=.5773502-\frac{.1934500}{3}+\frac{.0641500}{5}-\frac{.0213833}{7}+\frac{.0091277}{9}-\frac{.0023759}{11}+\frac{.0007919}{13}-\frac{.0002639}{15}+\frac{.0000879}{17}-\frac{.0000293}{19}+\frac{.0000097}{21}-\frac{.0000032}{23}=.5235987$: for the length of an arch of 30 degrees, which multiplied by 6 gives 3.141592 + for the length of the ſemi-periphery of the circle whoſe radius is unity.

Other ſeries may be deduced from the verſed ſine, ſine and ſecant; and theſe are of uſe for finding fluents which cannot be expreſſed in finite terms.

$$\text{the fluent of}\left\{\begin{array}{c}\frac{\dot{w}}{\sqrt{2aw--w^2}}\\[1ex]\frac{\dot{w}}{\sqrt{a^2--w^2}}\\[1ex]\frac{a\dot{w}}{{}^2+w^2}\\[1ex]\frac{a\dot{w}}{w\sqrt{w^2-a^2}}\end{array}\right\}\text{is equal to the arch whoſe}\left\{\begin{array}{l}\text{Verſed ſine}\\[1ex]\text{Right ſine}\\[1ex]\text{Tangent}\\[1ex]\text{Secant}\end{array}\right\}\text{is }\frac{w}{a},\text{ and Radius Unity.}$$

Prob. 3. *To find the contents of a ſolid.*

Let the ſurface of the generating plane be multiplied by the ſpace it paſſes through in any time, the product will give a ſolid which is the fluxion of the ſolid required: the ſurface muſt therefore be computed in terms of x, which repreſents the line or axis on which it moves, and by its motion on which the fluxion is to be meaſured, and the fluent found will give the contents of the ſolid.

Examp. Let it be propoſed to find the content of a cone ABC, fig. 10.

Put the given altitude (AD) of the cone $=a$, and the ſemi-diameter (BD) of its baſe $=b$, the ſolid $=s$, its fluxion $=\dot{s}$, and the area of a circle, whoſe radius is unity, $=p$: then the diſtance (AF) of the circle EG, from the vertex A, being denoted by x, we have, by ſimilar triangles, as $a : b :: x :$ EF (y) $=\frac{bx}{a}$. Whence in this caſe, $\dot{s}\ (=p\dot{y}^2\dot{x})=\frac{pb^2x^2\dot{x}}{a^2}$; and conſequently $s=\frac{pb^2x^3}{3a^2}$; which, when $x=a$ (=AD) gives $\frac{pb^2a}{3}$ ($=p\times BD^2\times\frac{1}{3}AD$) for the content of the whole cone ABC: which appears from hence to be juſt $\frac{1}{3}$ of a cylinder of the ſame baſe and altitude.

Prob. 4. *To compute the ſurface of any ſolid body.*

The fluxion of the ſurface of the ſolid is equal to the periphery of the ſurface, by whoſe motion the ſolid is generated, multiplied by its velocity on the edge of the ſolid, and the computation is made as in the foregoing.

Examp. Let it be propoſed to determine the convex ſuperficies of a cone ABC, fig. 11.

Then, the ſemi-diameter of the baſe (BD, or CD) being put $=b$, the ſlanting line or hypothenuſe $AC=c$, and FH (parallel to DC) $=y$, $AG=z$, the ſurface $=w$, its fluxion $=\dot{w}$, and $p=$ the periphery of a circle whoſe diameter is unity, we ſhall, from the ſimilarity of the triangles ADC and H*mh*, have $b:c::\dot{y}$ (mh) $:\dot{x}$ (Hh) $=\frac{c\dot{y}}{b}$: whence $\dot{w}$ ($2py\dot{z}$) $=\frac{2pcy\dot{y}}{b}$; and conſequently $w=\frac{pcy^2}{b}$. This, when $y=b$, becomes $=pcb=p\times DC\times AC=$ the convex ſuperficies of the whole cone ABC: which therefore is equal to a rectangle under half the circumference of the baſe and the ſlanting line.

The method of fluxions is alſo applied to find the centres of gravities, and oſcillation of different bodies; to determine the paths deſcribed by projectiles and bodies acted on by central forces, with the laws of centripetal force in different curves, the retardates given to motions performed in reſiſting medii, the attractions of bodies under different forms, the direction of wind which has the greateſt effect on an engine, and to ſolve many other curious and uſeful problems.

F L Y

Fly.

FLY, in zoology, a large order of inſects, the diſtinguiſhing characteriſtic of which is, that their wings are tranſparent. By this they are diſtinguiſhed from beetles, butterflies, graſshoppers, &c. See Scarabæus, Gryllus, &c.

Flies are ſubdivided into thoſe which have four, and thoſe which have two wings.

Of thoſe with four wings there are ſeveral genera or kinds; as the ant, apis, ichneumon, &c. See Apis, Formica, &c.

Of thoſe with two wings, there are likewiſe ſeveral kinds, as the gad-fly, gnat, &c. See Gad-*Fly*, &c.

Thoſe who deſire a more particular account of the anatomy, generation, ſtructure, and manifold ſubdiviſions of flies, may conſult Reaumur's Hiſtory of Inſects, tom. 4.

Fly, in mechanics, a croſs with leaden weights at its ends; or rather, a heavy wheel at right angles to the axis of a windlaſs, jack, or the like; by means of which, the force of the power, whatever it is, is not only preſerved, but equally diſtributed in all parts of the revolution of the machine. See Mechanics.

Flies *for Fiſhing*. See Fishing-*Fly*.

Vegetable Fly, a very curious natural production chiefly found in the Weſt Indies. "Excepting that it has no wings, it reſembles the drone both in ſize and colour more than any other Britiſh inſect. In the month of May it buries itſelf in the earth, and begins to vegetate. By the latter end of July the tree is arrived at its full growth, and reſembles a coral branch; and is about three inches high, and bears ſeveral little pods, which dropping off become worms, and from thence flies, like the Britiſh caterpillar."

Phil. Tranſ. for 1763.

Such was the account originally given of this extraordinary production. But ſeveral boxes of theſe flies having been ſent to Dr Hill for examination, his report was this: "There is in Martinique a fungus of the clavaria kind, different in ſpecies from thoſe hitherto known. It produces ſoboles from its ſides, I call it therefore *clavaria ſobolifera*. It grows on putrid animal bodies, as our *fungus ex pede equino* from the dead horſe's hoof.

"The cicada is common in Martinique, and in its nympha ſtate, in which the old authors call it *tettigometra*: it buries itſelf under dead leaves to wait its change; and, when the ſeaſon is unfavourable, many periſh. The ſeeds of the clavaria find a proper bed on this dead inſect, and grow.

"The tettigometra is among the cicadæ in the Britiſh muſeum; the clavaria is juſt now known.

"This is the fact, and all the fact; though the untaught inhabitants ſuppoſe a fly to vegetate, and though there is a Spaniſh drawing of the plant's growing into a trifoliate tree, and it has been figured with the creature flying with this tree upon its back."

Fly.

The ingenious Mr Edwards has taken notice of this extraordinary production in his Gleanings of Natural Hiſtory, from which the figures on Plate CV. are taken.

Fly-*Boat*, or *Flight*, a large flat-bottomed Dutch veſſel, whoſe burden is generally from 400 to 600 tons. It is diſtinguiſhed by a ſtern remarkably high, reſembling a Gothic turret, and by very broad buttocks below.

Fly-*Catcher*, in zoology. See Muscicapa.

Fly-*Trap*, in botany, a newly diſcovered ſenſitive plant. See Dionæa *Muſcipula*.

Fly-*Tree*, in natural hiſtory, a name given by the common people of America to a tree, whoſe leaves, they ſay, at a certain time of the year produce *flies*. On examining theſe leaves about the middle of ſummer, the time at which the flies uſe to be produced, there are found on them a ſort of bags of a tough matter, of about the ſize of a filbert, and of a duſky greeniſh colour. On opening one of theſe bags with a knife, there is uſually found a ſingle full-grown fly, of the gnat kind, and a number of ſmall worms, which in a day or two more have wings and flee away in the form of their parent. The tree is of the mulberry kind, and its leaves are uſually very largely ſtocked with theſe inſect-bags; and the generality of them are found to contain the inſects in their worm-ſtate; when they become winged, they ſoon make their way out. The bags begin to appear when the leaves are young, and afterwards grow with them; but they never rumple the leaf, or injure its ſhape. They are of the kind of leaf-galls, and partake in all reſpects, except ſize, of a ſpecies we have frequent on the large maple, or, as it is called, the *ſycamore*.

The fly-tree is found in many parts of France, where it grows in great abundance, and is there ſaid to bear fruit which give origin to a vaſt number of flies. The truth of the matter is this. The tree is a ſpecies of turpentine tree, and frequently produces or gives origin to certain tubercles, which, in the common turpentine tree, are called its *horns*. Theſe are a ſort of long bladders, of the length and thickneſs of a finger; which ariſe, not from the ſtalks, as fruits do, but from the ſurface of the leaves, and are only a kind of leaf-galls formed of an elongation of its outer membranes, occaſioned by the punctures of a number of inſects contained within it, which occaſion a derivation of freſh juices to the part. Theſe inſects are not flies of the common kind, but are the pucerons ſo well known for feeding on the leaves and tender ſtalks of trees; and ſome few of theſe only are winged, the others being deſtitute of them.—The origin of theſe tubercles or bladders is this. The female puceron, as ſoon as produced from the parent, makes a way under the membrane that covers the leaf, by means of a hole bored in it with the trunk. This hole ſoon heals up after ſhe is in; and the young ones, which ſhe afterwards produces, by their wounding and ſucking the ſides of the lodgment in which they find themſelves placed, occaſion all the ſwelling and growth of the tubercle.

FLYING, the progreſſive motion of a bird, or other winged animal, in the air.

The parts of birds chiefly concerned in flying are the wings, by which they are ſuſtained or wafted along. The tail, Meſſrs Willoughby, Ray, and many others, imagine to be principally employed in ſteering and turning the body in the air, as a rudder: but Borelli has put it beyond all doubt, that this is the leaſt uſe of it, which is chiefly to aſſiſt the bird in its aſcent and deſcent in the air, and to obviate the vacillations of the body and wings: for, as to turning to this or that ſide, it is performed by the wings and inclination of the body, and but very little by the help of the tail. The flying of a bird, in effect, is quite a different thing from the rowing of a veſſel. Birds do not vibrate their wings towards the tail, as oars are ſtruck towards the ſtern, but waft them downwards; nor does the tail of the bird cut the air at right angles, as the rudder does the water; but is diſpoſed horizontally, and preſerves the ſame ſituation what way ſoever the bird turns.

In effect, as a veſſel is turned about on its centre of gravity to the right, by a briſk application of the oars to the left; ſo a bird, in beating the air with its right wing alone, towards the tail, will turn its fore-part to the left. Thus pigeons changing their courſe to the left, would labour it with their right wing, keeping the other almoſt at reſt. Birds of a long neck alter their courſe by the inclination of their head and neck; which altering the courſe of gravity, the bird will proceed in a new direction.

The manner of FLYING is thus: The bird firſt bends his legs, and ſprings with a violent leap from the ground; then opens and expands the joints of his wings, ſo as to make a right line perpendicular to the ſides of his body: thus the wings, with all the feathers therein, conſtitute one continued lamina. Being now raiſed a little above the horizon, and vibrating the wings with great force and velocity perpendicularly againſt the ſubject air, that fluid reſiſts thoſe ſucceſſions, both from its natural inactivity and elaſticity, by means of which the whole body of the bird is protruded. The reſiſtance the air makes to the withdrawing of the wings, and conſequently the progreſs of the bird, will be ſo much the greater, as the waft or ſtroke of the fan of the wing is longer: but as the force of the wing is continually diminiſhed by this reſiſtance, when the two forces continue to be *in equilibrio*, the bird will remain ſuſpended in the ſame place; for the bird only aſcends ſo long as the arch of air the wing deſcribes makes a reſiſtance equal to the exceſs of the ſpecific gravity of the bird above the air. If the air, therefore, be ſo rare as to give way with the ſame velocity as it is ſtruck withal, there will be no reſiſtance, and conſequently the bird can never mount. Birds never fly upwards in a perpendicular line, but always in a parabola. In a direct aſcent, the natural and artificial tendency would oppoſe and deſtroy each other, ſo that the progreſs would be very ſlow. In a direct deſcent they would aid one another, ſo that the fall would be too precipitate.

Artificial FLYING, that attempted by men, by the aſſiſtance of mechanics.

The art of flying has been attempted by ſeveral perſons in all ages. The Leucadians, out of ſuperſtition, are reported to have had a cuſtom of precipitating a man from a high cliff into the ſea, firſt fixing feathers, variouſly expanded, round his body, in order to break the fall.

Friar Bacon, who lived near 500 years ago, not only affirms the art of flying poſſible, but aſſures us, that he himſelf knew how to make an engine wherein a man ſitting might be able to convey himſelf through the air like a bird; and further adds, that there was then one who had tried it with ſucceſs. The ſecret conſiſted in a couple of large thin hollow copper-globes, exhauſted of air; which being much lighter than air, would ſuſtain a chair, whereon a perſon might ſit. Fa. Franciſco Lana, in his *Prodromo*, propoſes the ſame thing, as his own thought. He computes, that a round veſſel of plate-braſs, 14 foot in diameter, weighing three ounces the ſquare foot, will only weigh 1848 ounces; whereas a quantity of air of the ſame bulk, will weigh $2155\frac{2}{3}$ ounces; ſo that the globe will not only be ſuſtained in the air, but will carry with it a weight of $373\frac{2}{3}$ ounces; and by increaſing the bulk of the globe, without increaſing the thickneſs of the metal, he adds, a veſſel might be made to carry a much greater weight.—But the fallacy is obvious: a globe of the dimenſions he deſcribes, Dr Hook ſhews, would not ſuſtain the preſſure of the air, but be cruſhed inwards. Beſide, in whatever ratio the bulk of the globe were increaſed, in the ſame muſt the thickneſs of the metal, and conſequently the weight, be increaſed: ſo that there would be no advantage in ſuch augmentation.

The ſame author deſcribes an engine for flying, invented by the Sieur Beſnier, a ſmith of Sable, in the county of Maine. *Vid. Philoſoph. Collect.* N° 1.

The philoſophers of king Charles the ſecond's reign were mightily buſied about this art. The famous biſhop Wilkins was ſo confident of ſucceſs in it, that he ſays, he does not queſtion but, in future ages, it will be as uſual to hear a man call for his wings, when he is going a journey, as it is now to call for his boots.

Flying *Bridge*. See Bridge.

Flying *Fiſh*, a name given by the Engliſh writers to ſeveral ſpecies of fiſh, which, by means of their long fins, have a method of keeping themſelves out of water a long time. See Exocoetus.

Flying *Pinion*, is part of a clock, having a fly, or fan, whereby to gather air, and ſo bridle the rapidity of the clock's motion, when the weight deſcends in the ſtriking part.

FO, or Foe; an idol of the Chineſe. He was originally worſhipped in the Indies, and tranſported from thence into China, together with the fables with which the Indian books were filled. He is ſaid to have performed moſt wonderful things, which the Chineſe have deſcribed in ſeveral volumes, and repreſented by cuts.

Sect of Fo. See China, n° 61.

FOAL, or Colt *and* Filly; the young of the horſe kind. The word *colt*, among dealers, is underſtood of the male, as *filly* is of the female. See Colt.

FOCUS, in geometry and conic ſections, is applied to certain points in the parabola, ellipſis, and hyperbola, where the rays reflected from all parts of theſe curves concur and meet. See Conic *Sections*.

Focus, in optics; a point in which any number of rays, after being reflected or refracted, meet.

FODDER, any kind of meat for horſes or other cattle. In ſome places, hay and ſtraw, mingled together, is peculiarly denominated *fodder*.

Fodder, in the civil law, is uſed for a prerogative that the prince has, to be provided of corn and other meats for his horſes, by the ſubjects, in his warlike expeditions.

Fodder, in mining, a meaſure containing 22 hundred and an half weight, though in London but 20 hundred weight.

FOENUGREEK, in botany. See Trigonella.

FOENUS nauticum. Where money was lent to a merchant, to be employed in a beneficial trade, with condition to be repaid, with extraordinary intereſt, in caſe ſuch voyage was ſafely performed, the agreement was ſometimes called *fœnus nauticum*, ſometimes *uſura maritima*. But as this gave an opening for uſurious and gaming contracts, 19 *Geo. II. c.* 37. enacts, that all money lent on bottomry, or at *reſpondentia*, on veſſels bound to or from the Eaſt Indies, ſhall be expreſsly lent only upon the ſhip or merchandiſe; the lender to have the benefit of ſalvage, &c. *Blackſt. Com.* II. 459. *Mol. de Jur. Mar.* 361.

FOESIUS (Anulius), a very learned and celebrated phyſician of the faculty of Paris, born at Metz in 1528. He tranſlated into Latin the whole works of Hippocrates, judiciouſly correcting the Greek text as he went along; and compoſed a kind of dictionary to him, intitled *Oeconomia Hippocratis*. He tranſlated, beſide, the Commentaries of Galen upon the ſecond book of Hippocrates; and was the author of ſome other works. After practiſing phyſic a long time with great ſucceſs and reputation, at Lorrain and other places, he died in 1596.

FOETOR, in medicine, ſtinking or fœtid effluvia ariſing from the body or any part thereof.

FOETUS, the young of all viviparous animals whilſt in the womb, and of oviparous animals before being hatched: the name is transferred by botaniſts to the *embryos of vegetables*.

In the human fetus are ſeveral peculiarities not to be found in the adult; ſome of them are as follows. 1. The arteries of the navel-ſtring, which are continuations of the hypograſtics, are, after the birth, ſhrivelled up, and form the ligamenta umbilic. infer. 2. The veins of the navel-ſtring are formed by the union of all the venaous-branches in the placenta, and paſſing into the abdomen become the falciform ligament of the liver. 3. The lungs, before being inflated with air, are compact and heavy; but after one inſpiration they become light, and as it were ſpongy: and it may be noted here, that the notion of the lungs ſinking in water before the child breathes, and of their ſwimming after the reception of air, are no certain proofs that the child had or had not breathed, much leſs that it was murdered: for the uninflated lungs become ſpecifically lighter than water as ſoon as any degree of putrefaction takes place in them; and this ſoon happens after the death of the child: beſides, where the utmoſt care hath been taken to preſerve the child, it hath breathed once or twice, and then died. 6. The thymus gland is very large in the fetus, but dwindles away in proportion as years advance. 7. The foramen ovale in the heart of a fetus, is generally cloſed in an adult.

For an account of the different opinions concerning the formation and growth of the fetus. See Generation.

FOG, or Mist, a meteor, conſiſting of groſs vapours, floating near the ſurface of the earth.

Miſts, according to lord Bacon, are imperfect condenſations of the air, conſiſting of a large proportion of the air, and a ſmall one of the aqueous vapour: and theſe happen in the winter, about the change of the weather from froſt to thaw, or from thaw to froſt; but in the ſummer, and in the ſpring, from the expanſion of the dew.

If the vapours, which are raiſed plentifully from the earth and waters, either by the ſolar or ſubterraneous heat, do, at their firſt entrance into the atmoſphere, meet with cold enough to condenſe them to a conſiderable degree, their ſpecific gravity is by that means increaſed; and ſo they will be ſtopped from aſcending, and either return back, in form of dew or of drizzling rain; or remain ſuſpended ſome time in the form of a fog. Vapours may be ſeen on the high grounds as well as the low, but more eſpecially about marſhy places: they are eaſily diſſipated by the wind, as alſo by the heat of the ſun: they continue longeſt in the loweſt grounds, becauſe theſe places contain moſt moiſture, and are leaſt expoſed to the action of the wind.

Hence we may eaſily conceive, that fogs are only low clouds, or clouds in the loweſt region of the air; as clouds are no other than fogs raiſed on high. See Cloud.

When fogs ſtink, then the vapours are mixed with ſulphureous exhalations, which ſmell ſo. Objects viewed through fogs, appear larger and more remote than through the common air. Mr Boyle obſerves, that upon the coaſt of Coromandel, and moſt maritime parts of the Eaſt-Indies, there are, notwithſtanding the heat of the climate, annual fogs ſo thick, as to occaſion people of other nations who reſide there, and even the more tender ſort of the natives, to keep their houſes cloſe ſhut up.

Fogs are commonly pretty ſtrongly electrified, as appears from Mr Cavallo's obſervations upon them. See Electricity, n° 69.

FOGAGE, in the foreſt-law, is rank graſs, not eaten up in ſummer.

FOGLIETA (Oberto or Hubert), a Genoeſe prieſt, and one of the moſt learned writers of the 16th century. He had a ſhare in the diſturbances that were raiſed at Genoa; for which he was baniſhed, and died at Rome in 1581, aged 63. He wrote a hiſtory of Genoa in Italian, which is highly eſteemed; and many works in Latin.

FOGO, or Fuego, a ſmall iſland in the Atlantic Ocean, and one of the Cape de Verds. It is remarkable for a mountain that vomits fire and flames, like Mount Veſuvius. It ſometimes throws out large ſtones, with a noiſe like thunder. The few inhabitants that are here, live at the foot of this mountain. W. Long. 24. 47. N. Lat. 15. 20.

FOHI. See Fe; and China, n° 7.

FOIBLE, a French term, frequently uſed alſo in our language. It literally ſignifies *weak;* and in that ſenſe is applied to the body of animals, and the parts thereof; as, *foible* reins, *foible* ſight, &c. being derived from the Italian *fievole*, of the Latin *flebiles*, to be "lamented, pitied."

But it is chiefly uſed with us ſubſtantively, to denote a defect or flaw in a perſon or thing. Thus we ſay, Every perſon has his foible; and the great ſecret conſiſts in hiding it artfully: Princes are gained by flattery, that is their foible: The foible of young people is pleaſure; the foible of old men is avarice; the foible of the great and learned is vanity; the foible of women and girls, coquetry, or an affectation of having gallants: You ſhould know the forte and the foible of a man, before you employ him: We ſhould not let people perceive that we know their foible.

FOIL, among glaſs-grinders, a ſheet of tin, with quickſilver, or the like, laid on the backſide of a looking-glaſs, to make it reflect. See Foliating.

Foil, among jewellers, a thin leaf of metal placed under a precious ſtone, in order to make it look tranſparent, and give it an agreeable different colour, either deep or pale: thus, if you want a ſtone to be of a pale colour, put a foil of that colour under it; or, if you would have it deep, lay a dark one under it.

Theſe foils are made either of copper, gold, or gold and ſilver together. The copper foils are commonly known by the name of *Nuremberg* or *German foils;* and are prepared as follows: Procure the thinneſt copper-plates you can get: beat theſe plates gently upon a well-poliſhed anvil, with a poliſhed hammer, as thin as poſſible; and placing them between two iron-plates as thin as writing-paper, heat them in the fire; then boil the foil, in a pipkin, with equal quantities of tartar and ſalt, conſtantly ſtirring them till by boiling they become white; after which, taking them out, and drying them, give them another hammering, till they are made fit for your purpoſe: however, care muſt be taken not to give the foils too much heat, for fear of melting; nor muſt they be too long boiled, for fear of attracting too much ſalt.

The manner of poliſhing theſe foils is as follows. Take a plate of the beſt copper, one foot long and about five or ſix inches wide, poliſhed to the greateſt perfection; bend this to a long convex, faſten it upon a half roll, and fix it to a bench or table; then take ſome chalk, waſhed as clean as poſſible, and filtred through a fine linen-cloth, till it be as fine as you can make it; and, having laid ſome thereof on the roll, and wetted the copper all over, lay your foils on it, and with a poliſhing ſtone and the chalk, poliſh your foils till they are as bright as a looking-glaſs; after which they muſt be dried, and laid up ſecure from duſt.

FOKIEN, a province of China in Aſia, commodiouſly ſituated for navigation and commerce, part of it bordering on the ſea, in which they catch large quantities of fiſh, which they ſend ſalted to other parts of the empire. Its ſhores are very uneven, by reaſon of the number and variety of its bays; and there are many forts built thereon to guard the coaſt. The air is hot, but pure and wholeſome.

The mountains are almoſt every where diſpoſed into a kind of amphitheatres, by the labour of the inhabitants, with terraſſes placed one above another. The fields are watered with rivers and ſprings, which iſſue out of the mountains, and which the huſbandmen conduct in ſuch a manner as to overflow the fields of rice when they pleaſe, becauſe it thrives beſt in watery ground. They make uſe of pipes of bamboe for this purpoſe.

They have all commodities in common with the reſt of China; but more particularly muſk, precious ſtones, quickſilver, ſilk, hempen-cloth, callico, iron, and all ſorts of utenſils wrought to the greateſt perfection. From other countries they have cloves, cinnamon, pepper, ſandal-wood, amber, coral, and many other things. The capital city is Foutcheou Fou; or, as others would have it written, Fucherofu. But as for Fokien, which moſt geographers make the capital, there is no ſuch place.

FOLC-lands, (Sax.) copy-hold lands ſo called in the time of the Saxons, as charter-lands were called *boc-lands*, Kitch. 174. *Folkland* was *terra vulgi*, or *popularis;* the land of the vulgar people, who had no certain eſtate therein, but held the ſame, under the rents and ſervices accuſtomed or agreed, at the will only of their lord the thane; and it was therefore not put in writing, but accounted *prædium ruſticum & ignobile.* Spelm. of Feuds, *c.* 5.

FOLCMOTE, or Folkmote, (Sax. *Folcgemot*, i. e. *conventus populi)*, is compounded of *folk*, *populus*, and *mote*, or *gemote*, *convenire;* and ſignified originally, as Somner in his Saxon Dictionary informs us, a general aſſembly of the people, to conſider of and order matters of the commonwealth. And Sir Henry Spelman ſays, the *folcmote* was a ſort of annual parliament, or convention of the biſhops, thanes, aldermen, and freemen, upon every May-day yearly; where the laymen were ſworn to defend one another and the king, and to preſerve the laws of the kingdom; and then conſulted of the common ſafety. But Dr Brady infers from the laws of the Saxon kings of England, that it was an inferior court, held before the king's *reeve* or ſteward, every month, to do *folk* right, or compoſe ſmaller differences, from whence there lay appeal to the ſuperior courts; *Gloſs*. p. 48. Squire ſeems to think the *folcmote* not diſtinct from the *ſhiremote*, or common general meeting of the county. See his *Angl. Sax. Gov*. 155. *n*.

Manwood mentions *folcmote* as a court holden in London, wherein all the *folk* and people of the city did complain of the mayor and aldermen, for miſgovernment within the ſaid city; and this word is ſtill in uſe among the Londoners, and denotes *celebrem ex tota civitate conventam*. *Stow's Survey*. According to Kennet, the *folcmote* was a common-council of all the inhabitants of a city, town, or borough, convened often by ſound of bell, to the *Mote Hall* or *Houſe*; or it was applied to a larger congreſs of all the freemen within a county, called the *ſhire-mote*, where formerly all knights and military tenants did fealty to the king, and elected the annual ſheriff on the 1ſt of October; till this popular election, to avoid tumults and riots, devolved to the king's nomination, *anno* 1315, 3 Edw. I. After which the city *folkmote* was ſwallowed up in a ſelect committee or common-council, and the county *folkmote* in the ſheriff's tourn and aſſiſes.

The word *folkmote* was alſo uſed for any kind of popular or public meeting; as of all the tenants at the *court-leet*, or *court-baron*, in which ſignification it was of a leſs extent. *Paroch. Antiq*. 120.

FOLENGIO (Theophilus), of Mantua, known alſo by the title of *Merlin Coccaye*, an Italian poet, remarkable for giving to a poem a name which has been adopted ever ſince for all trifling performances of the ſame ſpecies, conſiſting of buffoonry, puns, anagrams, wit without wiſdom, and humour without good-ſenſe. His poem was called *The Macaroni*, from an Italian cake of the ſame name, which is ſweet to the taſte, but has not the leaſt alimentary virtue, on the contrary palls the appetite and cloys the ſtomach. Theſe idle poems, however, became the reigning taſte in Italy and in France: they gave birth to macaroni academies; and, reaching England, to macaroni clubs; till, in the end, every thing inſipid, contemptible, and ridiculous, in the character, dreſs, or behaviour, of both men and women, is now ſummed up in the deſpicable appellation of *a macaroni*. Folengio died in 1544.

FOLIA, among botaniſts, particularly ſignify the leaves of plants; thoſe of flowers being expreſſed by the word PETALS. See LEAF.

FOLIAGE, a cluſter or aſſemblage of flowers, leaves, branches, &c.

FOLIAGE, is particularly uſed for the repreſentations of ſuch flowers, leaves, branches, rinds, &c. whether natural or artificial, as are uſed for enrichments on capitals, friezes, pediments, &c.

FOLIATING *of* LOOKING-GLASSES, the ſpreading the plates over, after they are poliſhed, with quickſilver, &c. in order to reflect the image. It is performed thus: A thin blotting paper is ſpread on the table, and ſprinkled with fine chalk; and then a fine lamina or leaf of tin, called *foil*, is laid over the paper; upon this is poured mercury, which is to be diſtributed equally over the leaf with a hare's foot or cotton: over this is laid a clean paper, and over that the glaſs-plate, which is preſſed down with the right-hand, and the paper drawn gently out with the left: this being done, the plate is covered with a thicker paper, and loaded with a greater weight, that the ſuperfluous mercury may be driven out and the tin adhere more cloſely to the glaſs. When it is dried, the weight is removed, and the looking-glaſs is complete.

Some add an ounce of marcaſite, melted by the fire; and, leſt the mercury ſhould evaporate in ſmoke, they pour it into cold water; and when cooled, ſqueeze through a cloth, or through leather.

Some add a quarter of an ounce of tin and lead to the marcaſite, that the glaſs may dry the ſooner.

FOLIATING *of Globe Looking-glaſſes*, is done as follows: Take five ounces of quickſilver, and one ounce of biſmuth; of lead and tin, half an ounce each: firſt put the lead and tin into fuſion, then put in the biſmuth; and when you perceive that in fuſion too, let it ſtand till it is almoſt cold, and pour the quickſilver into it: after this, take the glaſs-globe, which muſt be very clean, and the inſide free from duſt: make a paper-funnel, which put into the hole of the globe, as near the glaſs as you can, ſo that the amalgam, when you pour it in, may not ſplaſh, and cauſe the glaſs to be full of ſpots; pour it in gently, and move it about, ſo that the amalgam may touch every where: if you find the analgam begin to be curdly and fixed, then hold it over a gentle fire, and it will eaſily flow again; and if you find the amalgam too thin, add a little more lead, tin, and biſmuth to it. The finer and clearer your globe is, the better will the looking-glaſs be.

Dr Shaw obſerves, that this operation has conſiderable advantages, as being performable in the cold; and that it is not attended with the danger of poiſonous fumes from arſenic, or other unwholeſome matters, uſually employed for this purpoſe: beſides, how far it is applicable to the more commodious foliating of the common looking-glaſſes, and other ſpeculums, he thinks, may deſerve to be conſidered.

FOLIO, in merchants books, denotes a page, or rather both the right and left hand pages, theſe being expreſſed by the ſame figure, and correſponding to each other. See BOOK-KEEPING.

FOLIO, among printers and bookſellers, the largeſt form of books, when each ſheet is ſo printed that it may be bound up in two leaves only.

FOLIUM, or LEAF, in botany. See LEAF.

FOLKLAND, and FOLKMOTE. See FOLCLAND.

FOLLICULUS, (from *follis*, a bag), a ſpecies of ſeed-veſſel firſt mentioned by Linnæus in his *Delineatio plantæ*, generally conſiſting of one valve, which opens from bottom to top on one ſide, and has no ſuture for faſtening or attaching the ſeeds within it.

FOLLICULI are likewiſe defined by the ſame author to be ſmall glandular veſſels diſtended with air, which appear on the ſurface of ſome plants; as at the root of water-milfoil, and on the leaves of aldrovanda. In the former, the veſſels in queſtion are roundiſh, and furniſhed with an appearance like two horns; in the latter, pot-ſhaped and ſemi-circular.

FOMAHANT, in aſtronomy, a ſtar of the firſt magnitude in the conſtellation AQUARIUS.

FOMENTATION, in medicine, is a fluid externally applied, uſually as warm as the patient can bear it, and in the following manner. Two flannel cloths are dipped into the heated liquor, one of which is wrung as dry as the neceſſary ſpeed will admit, then immediately applied to the part affected; it lies on until

til the heat begins to go off, and the other is in readineſs to apply at the inſtant in which the firſt is removed: thus theſe flannels are alternately applied, ſo as to keep the affected part conſtantly ſupplied with them warm. This is continued 15 or 20 minutes, and repeated two or three times a-day.

Every intention of relaxing and ſoothing by fomentations, may be anſwered as well by warm water alone as when the whole tribe of emollients are boiled in it; but when diſcutients or antiſeptics are required, ſuch ingredients muſt be called in as are adapted to that end.

The degree of heat ſhould never exceed that of producing a pleaſing ſenſation; great heat produces effects very oppoſite to that intended by the uſe of fomentations.

FONT, among eccleſiaſtical writers, a large baſon, in which water is kept for the baptizing of infants or other perſons.

FONTAINE (John), the celebrated French poet, and one of the firſt-rate geniuſes of his age, was born at Chateau-Thierri in Champaigne, the 8th of July 1621, of a good extraction. At the age of 19 he entered amongſt the Oratorians, but quitted that order 18 months after. He was 22 years of age before he knew his own talents for poetry; but hearing an ode of Malherbe read, upon the aſſaſſination of Henry IV. he was ſo taken with admiration of it, that the poetical fire, which had before lain dormant within him, ſeemed to be enkindled from that of the other great poet. He applied himſelf to read, to meditate, to repeat, in fine, to imitate, the works of Malherbe. The firſt eſſays of his pen he confined to one of his relations, who made him read the beſt Latin authors, Horace, Virgil, Terence, Quintilian, &c. and then the beſt compoſitions in French and Italian. He applied himſelf likewiſe to the ſtudy of the Greek authors, particularly Plato and Plutarch. Some time afterwards his parents made him marry a daughter of a lieutenant-general, a relation of the great Racine. This young lady, beſides her very great beauty, was remarkable for the delicacy of her wit, and Fontaine never compoſed any work without conſulting her. But, as her temper was none of the beſt, to avoid diſſenſion, he ſeparated himſelf from her company as often as he well could. The famous ducheſs of Bouillon, niece to cardinal Mazarine, being exiled to Chateau-Thierri, took particular notice of Fontaine. Upon her recal he followed her to Paris; where, by the intereſt of one of his relations, he got a penſion ſettled upon him. He met with great friends and protectors amongſt the moſt diſtinguiſhed perſons of the court, but madam de la Sabliere was the moſt particular. She took him to live at her houſe; and it was then, that Fontaine, diveſted of domeſtic concerns, led a life conformable to his diſpoſition, and cultivated an acquaintance with all the great men of the age. It was his cuſtom, after he was fixed at Paris, to go every year, during the month of September, to his native place of Chateau-Thierri, and pay a viſit to his wife, carrying with him Racine, Deſpreaux, Chapelle, or ſome other celebrated writers. When he has ſometimes gone thither alone by himſelf, he has come away without remembring even to call upon her; but ſeldom omitted ſelling ſome part of his lands, by which means he ſquandered away a conſiderable fortune. After the death of madame de la Sabliere, he was invited into England, particularly by madame Mazarin, and by St Evremond, who promiſed him all the ſweets and comforts of life; but the difficulty of learning the Engliſh language, and the liberality of the duke of Burgundy, prevented his voyage.

About the end of the year 1692 he fell dangerouſly ill; and, as is cuſtomary upon theſe occaſions in the Romiſh church, he made a general confeſſion of his whole life to P. Poguet, an oratorian; and, before he received the ſacrament, he ſent for the gentlemen of the French academy, and in their preſence declared his ſincere compunction for having compoſed his Tales; a work he could not reflect upon without the greateſt repentance and deteſtation; promiſing, that if it ſhould pleaſe God to reſtore his health, he would employ his talents only in writing upon matters of morality or piety. He ſurvived this illneſs two years, living in the moſt exemplary and edifying manner, and died the 13th of March 1695, being 74 years of age. When they ſtripped his body, they found, next his ſkin, a hair-ſhirt; which gave room for the following expreſſion of the younger Racine:

Et l'Auteur de Joconde eſt orme d'un Cilice.

Fontaine's character is remarkable for a ſimplicity, candour, and probity, ſeldom to be met with. He was of an obliging diſpoſition; cultivating a real friendſhip with his brother poets and authors; and, what is very rare, beloved and eſteemed by them all. His converſation was neither gay nor brilliant, eſpecially when he was not among his intimate friends.

One day being invited to dinner at a farmer-general's, he eat a great deal, but did not ſpeak. Riſing up from table very early, under pretext of going to the academy, one of the company repreſented to him that it was not yet a proper time: "Well, (ſays he,) if it is not, I will ſtay a little longer." He had one ſon by his wife in the year 1660. At the age of 14, he put him into the hands of M. de Harley, the firſt preſident, recommending to him his education and fortune. It is ſaid, that having been a long time without ſeeing him, he happened to meet him one day viſiting, without recollecting him again, and mentioned to the company that he thought that young man had a good deal of wit and underſtanding. When they told him it was his own ſon, he anſwered in the moſt tranquil manner, "Ah! then I am very well contented with him." An indifference, or rather an abſence of mind, influenced his whole conduct, and rendered him often inſenſible to the inclemency of the weather. Madame de Bouillon going one morning to Verſailles, ſaw him, abſtracted in thought, ſitting in an arbour; returning at night, ſhe found him in the ſame place, and the ſame attitude, although it was very cold and had rained almoſt the whole day. He carried this ſimplicity ſo far, that he was ſcarce ſenſible of the bad effects ſome of his writings might occaſion, particularly his Tales. In a great ſickneſs, his confeſſor exhorting him to prayer and alms-deeds: "As for alms-deeds, (replied Fontaine,) I am not able, having nothing to give; but they are about publiſhing a new edition of my Tales, and the bookſeller owes me a hundred copies; you ſhall have them to ſell, and diſtribute their amount amongſt the poor." Another time P. Poguet exhorting him to repent of his faults, “ If he has committed any, (cried the nurſe), I am ſure it is more from ignorance than malice, for he has as much ſimplicity as an infant.”

One time having compoſed a tale, wherein he made a profane application of thoſe words of the goſpel, “ Lord, five talents thou didſt deliver to me,” he dedicated it, by a moſt ingenious prologue, to the celebrated Arnauld, telling him, it was to ſhew to poſterity the great eſteem he had for the learned doctor. He was not ſenſible of the indecency of the dedication, and the profane application of the text, till Boileau and Racine repreſented it to him. He addreſſed another, by a dedication in the ſame manner, to the archbiſhop of Paris. His Fables are an immortal work, exceeding every thing in that kind, both ancient and modern, in the opinion of the learned. People of taſte, the oftener they read them, will find continually new beauties and charms, not to be met with elſewhere. The deſcendants of this great poet are exempted in France from all taxes and impoſitions, a privilege which the intendants of Soiſſons to this day think it an honour to confirm to them.

FONTAINBLEAU, a town in the Iſle of France, and in the Gatinois, remarkable for its fine palace, which has been the place where the kings of France uſed to lodge when they went a-hunting. It was firſt embelliſhed by Francis I. and all the ſucceſſive kings have added ſomething thereto; inſomuch that it may now be called the fineſt pleaſure-houſe in the world. It ſtands in the midſt of a foreſt, conſiſting of 26.424 arpents of land, each containing 100 ſquare perches, and each perch 18 feet. E. Long. 2. 33. N. Lat. 40. 22.

FONTARABIA, a ſea-port town of Spain in Biſcay, and in the territory of Guipuſcoa, ſeated on a peninſula on the ſea-ſhore, and on the river Bidaſſoa. It is ſmall, but well fortified both by nature and art; and has a good harbour, tho' dry at low-water. It is built in the form of an amphitheatre, on the declivity of an hill, and ſurrounded on the land-ſide by the high Pyrenean mountains. It is a very important place, being accounted the key of Spain on that ſide. W. Long. 1. 43. N. Lat. 43. 23.

FONTENAY (John Baptiſt Blain de), a very famous painter of fruit and flowers, was born at Caen in 1654. Lewis XIV. gave him a penſion, and an apartment in the galleries of the Louvre; and he was nominated counſellor of the Academy of Painting. His fruit and flowers have all the freſhneſs and beauty of nature; the very dew ſeems to trickle down their ſtalks, with all the luſtre and tranſparency of the diamond, while the inſects upon them ſeem perfectly alive and animated. This ingenious painter died at Paris, in 1715.

FONTENELLE (Bernard de), a celebrated French author, was born in 1657, and died in 1756, when he was near 100 years old. He diſcharged the truſt of perpetual ſecretary to the Academy of Sciences above 40 years with univerſal applauſe; and his *Hiſtory of the Academy of Sciences* throws a great light upon their memoirs, which are very obſcure. The eloges which he pronounced on the deceaſed members of the academy, have this peculiar merit, that they excite a reſpect for the ſciences as well as for the author. In his poetical performances, and the *Dialogues of the dead*, the ſpirit of Voiture was diſcernible, though more extended and more philoſophical. His *Plurality of Worlds*, is a work ſingular in its kind; the deſign of which was to preſent that part of philoſophy to view in a gay and pleaſing dreſs. In his more advanced years, he publiſhed comedies, which, tho' they ſhewed the elegance of Fontenelle, were little fitted for the ſtage; and *An apology for Des Cartes's Vortices*. M. de Voltaire, who declares him to have been the moſt univerſal genius the age of Lewis XIV. produced, ſays, “ We muſt excuſe his comedies, on account of his great age; and his Carteſian opinions, as they were thoſe of his youth, when they were univerſally received all over Europe.”

FONTENOY, a town or village of the Auſtrian Netherlands, in the province of Hainault, and on the borders of Flanders; remarkable for a battle fought there between the allies and the French on the firſt of May 1745. The French were commanded by Mareſchal Saxe, and the Allies by the Duke of Cumberland. The latter behaved with great bravery; but through the ſuperiority of the numbers of the French army, and likewiſe the ſuperior generalſhip of their commander, the Allies were defeated with great ſlaughter. The Britiſh troops behaved with aſtoniſhing intrepidity, as their enemies themſelves owned. It is even ſaid, that the battle was loſt through the cowardice of the Dutch, who failed in their attack on the village of Fontenoy, on which the event of the day depended. E. Long. 2. 20. N. Lat. 50. 35.

Fontenoy, a village of France, in the duchy of Burgundy, remarkable for a bloody battle fought there in 841, between the Germans and the French, in which were killed above 100,000 men; and the Germans were defeated. E. Long. 3. 48. N. Lat. 47. 28.

FONTEVRAUD, or *Order of* Fontevraud, a religious order inſtituted about the latter end of the 11th century. By the rules of this order, the nuns were to keep ſilence for ever, and their faces to be always covered with their veils; and the monks wore a leathern girdle, at which hung a knife and ſheath.

FONTICULUS, or Fontanella, in ſurgery, an iſſue, ſeton, or ſmall ulcer, made in various parts of the body, in order to eliminate the latent corruption out of it.

FONTINALIS, water-moſs; a genus of the cryptogamia muſci claſs. There are four ſpecies, all of them natives of Britain. They grow on the brinks of rivulets, and on the trunks of trees. The moſt remarkable is the antipyretica, with purple ſtalks. The Scandinavians line the inſides of their chimneys with this moſs, to defend them againſt the fire; for, contrary to the nature of all other moſs, this is ſcarcely capable of burning.

FOOD, in the moſt extenſive ſignification of the word, implies whatever aliments are taken into the body, whether ſolid or fluid; but, in common language, it is generally uſed to ſignify only the ſolid part of our aliment.

The moſt remarkable diſtinction of foods is into thoſe which are already aſſimilated into the animal nature, and ſuch as are not. Of the firſt kind are animal ſubſtances in general; which if not entirely ſimilar, are nearly ſo, to our nature. The ſecond comprehends vegetables, which are much more difficultly aſſimilated.

ted. But, as the nouriſhment of all animals, even thoſe which live on other animals, can be traced originally to the vegetable kingdom, it is plain, that the principle of all nouriſhment is in vegetables.

Cullen on the Mat. Med.

Though there is, perhaps, no vegetable which does not afford nouriſhment to ſome ſpecies of animals or other; yet, with regard to mankind, a very conſiderable diſtinction is to be made. Thoſe vegetables which are of a mild, bland, agreeable taſte, are proper nouriſhment; while thoſe of an acrid, bitter, and nauſeous nature, are improper. We uſe, indeed, ſeveral acrid ſubſtances as food; but the mild, the bland, and agreeable, are in the largeſt proportion in almoſt every vegetable. Such as are very acrid, and at the ſame time of an aromatic nature, are not uſed as food, but as ſpices or condiments, which anſwer the purpoſes of medicine rather than any thing elſe. Sometimes, indeed, acrid and bitter vegetables ſeem to be admitted as food. Thus celeri and endive are uſed in common food, though both are ſubſtances of conſiderable acrimony; but it muſt be obſerved, that, when we uſe them, they are previouſly blanched, which almoſt totally deſtroys their acrimony. Or if we employ other acrid ſubſtances, we generally, in a great meaſure, deprive them of their acrimony by boiling. In different countries the ſame plants grow with different degrees of acrimony. Thus, garlic here ſeldom enters our food; but in the ſouthern countries, where the plants grow more mild, they are frequently uſed for that purpoſe. The plant which furniſhes caſſada, being very acrimonious, and even poiſonous, in its recent ſtate, affords an inſtance of the neceſſity of preparing acrid ſubſtances even in the hot countries: and there are other plants, ſuch as arum-root, which are ſo exceedingly acrimonious in their natural ſtate, that they cannot be ſwallowed with ſafety; yet, when deprived of that acrimony, will afford good nouriſhment.

The moſt remarkable properties of different vegetable ſubſtances as food, are taken notice of under their different names; here we ſhall only compare vegetable foods in general with thoſe of the animal kind.

I. *In the Stomach*, they differ remarkably, in that the vegetables always have a tendency to acidity, while animal-food of all kinds tend rather to alkaleſcency and putrefaction. Some animal-foods, indeed, turn manifeſtly acid before they putrify; and it has been aſſerted, that ſome degree of aceſcency takes place in every king of animal-food before digeſtion. This aceſcency of animal-food, however, never comes to any morbid degree, but the diſeaſe is always on the ſide of putreſcency. The aceſcency of vegetables is more frequent, and ought to be more attended to, than the alkaleſcency of animal food; which laſt, even in weak ſtomachs, is ſeldom felt; while aceſcency greatly affects both the ſtomach and ſyſtem.

With regard to their difference of *ſolution*:—Heavineſs, as it is called, is ſeldom felt from vegetables, except from tough farinaceous paſte, or the moſt viſcid ſubſtances; while the heavineſs of animal-food is more frequently noticed, eſpecially when in any great quantity. Difficulty of ſolution does not depend ſo much on firmneſs of texture, (as a man, from fiſh of all kinds, is more oppreſſed than from firmer ſubſtances), but on viſcidity; and hence it is more frequent in animal-food, eſpecially in the younger animals.

With regard to *mixture*:—There is no inſtance of difficult mixture in vegetables, except in vegetable oils; while animal-foods, from both viſcidity and oilineſs, eſpecially the fatter meats, are refractory in this reſpect. Perhaps the difference of animal and vegetable foods might be referred to this head of mixture. For vegetable food continues long in the ſtomach, giving little ſtimulus: Now the ſyſtem is affected in proportion to the extent of this ſtimulus, which is incomparably greater from the animal viſcid oily food, than from the vegetable, firmer, and more aqueous. However, there are certain applications to the ſtomach, which have a tendency to bring on the cold fit of fever, independent of ſtimulus, merely by their refrigeration: and this oftener ariſes from vegetables; as we ſee, in thoſe hot countries where intermittents prevail, they are oftener induced from a ſurfeit of vegetable than of animal food. A proof of this is, that when one is recovering of an intermittent, there is nothing more apt to cauſe a relapſe than cold food, eſpecially if taken on thoſe days when the fit ſhould return, and particularly aceſcent, fermentable vegetables, as ſallad, melons, cucumbers, &c. *acido-dulces*, &c. which, according to Dr Cullen, are the moſt frequent cauſes of epidemics; therefore, when an intermittent is to be avoided, we ſhun vegetable diet, and give animal-foods, although their ſtimulus be greater.

II. *In the Inteſtines*. When the putreſcency of animal-food has gone too far, it produces an active ſtimulus, cauſing diarrhœa, dyſentery, &c. But theſe effects are but rare: whereas from vegetable food and its acid, which, united with the bile, proves a pretty ſtrong ſtimulus, they more frequently occur; but, luckily, are of leſs conſequence, if the refrigeration is not very great. In the autumnal ſeaſon, when there is a tendency to dyſentery, if it is obſerved that eating of fruits brings it on, it is rather to be aſcribed to their cooling than ſtimulating the inteſtines.

As to *ſtool*—Wherever neither putrefaction, nor acidity, has gone a great length, animal-food keeps the belly more regular. Vegetable food gives a greater proportion of feculent matter, and, when exſiccated by the ſtomach and inteſtines, is more apt to ſtagnate, and produce ſlow belly and coſtiveneſs, than animal ſtimulating food; which, before it comes to the great guts, where ſtoppage is made, has attained a putrefactive tendency, and gives a proper ſtimulus: and thus thoſe who are coſtive from the uſe of vegetables, when they have recourſe to animal-food are in this reſpect better.

III. *In the blood-veſſels*. They both give a blood of the ſame kind, but of different quality. Animal-food gives it in greater quantity, being in great part, as the expreſſion is, convertible *in ſuccum et ſanguinem*, and of eaſy digeſtion; whereas vegetable is more watery, and contains a portion of unconquerable ſaline matter, which cauſes it to be thrown out of the body by ſome excretion. Animal-food affords a more denſe ſtimulating elaſtic blood than vegetable; ſtretching and cauſing a greater reſiſtance in the ſolids, and again exciting their ſtronger action. It has been ſuppoſed, that aceſcency of vegetable food is carried into the blood-veſſels, and there exerts its effects; but the tendency of animal-fluids is ſo ſtrong to alkaleſcency, that the exiſtence of an acid acrimony in animal-blood ſeems very improbable. Animal-food alone will ſoon produce an alkaleſcent acrimony; and if a perſon who lives entirely on vegetables were to take no food for a few days, his acrimony would be alkaleſcent.

IV. We are next to take notice of the *quantity of nutriment* theſe different foods afford. Nutriment is of two kinds: the firſt repairs the waſte of the ſolid fibres; the other ſupplies certain fluids, the chief of which is oil. Now, as animal-food is eaſier converted, and alſo longer retained in the ſyſtem, and as it contains a greater proportion of oil, it will afford both kinds of nutriment more copiouſly than vegetables.

V. Laſtly, *As to the different degrees of perſpirability of theſe foods.* This is not yet properly determined. Sanctorius conſtantly ſpeaks of mutton as the moſt perſpirable of all food, and of vegetables as checking perſpiration. This is a conſequence of the different ſtimulus thoſe foods give to the ſtomach, ſo that perſons who live on vegetables have not their perſpiration ſo ſuddenly excited. In time of digeſtion, perſpiration is ſtopped from whatever food, much more ſo from cooling vegetables. Another reaſon why vegetables are leſs perſpirable is, becauſe their aqueo-ſaline juices determine them to go off by urine, while the more perfectly mixed animal-food is more equally diffuſed over the ſyſtem, and ſo goes off by perſpiration. Hence Sanctorius's accounts may be underſtood; for vegetable aliment is not longer retained in the body, but moſtly takes the courſe of the kidneys. Both are equally perſpirable in this reſpect, viz. that a perſon living on either, returns once a-day to his uſual weight; and if we conſider the little nouriſhment of vegetables, and the great tendency of animal food to corpulency, we muſt allow that vegetable is more quickly perſpired than animal-food.

As to the queſtion, Whether man was originally deſigned for animal or vegetable food, ſee the article CARNIVOROUS.

With regard to the effects of theſe foods on men, it muſt be obſerved, that there are no perſons who live entirely on vegetables. The Pythagoreans themſelves eat milk; and thoſe who do ſo moſtly, as theſe Pythagoreans, are weakly, ſickly, and meagre, labouring under a conſtant diarrhœa and ſeveral other diſeaſes. None of the hardy, robuſt, live on theſe; but chiefly ſuch as gain a livelihood by the exertion of their mental faculties, as (in the Eaſt Indies) factors and brobrokers; and this method of life is now confined to the hot climates, where vegetable diet, without inconvenience, may be carried to great exceſs. Though it be granted, therefore, that man is intended to live on theſe different foods promiſcuouſly, yet the vegetable ſhould be in very great proportion. Thus the Laplanders are ſaid to live entirely on animal-food: but this is contradicted by the beſt accounts; for Linneus ſays, that beſides milk, which they take ſour, to obviate the bad effects of animal-food, they uſe alſo calla, menyanthes, and many other plants copiouſly. So there is no inſtance of any nation living entirely either on vegetable or animal food, though there are indeed ſome who live particularly on one or other in the greateſt proportion. In the cold countries, *e. g.* the inhabitants live chiefly on animal-food, on account of the rigour of the ſeaſon, their ſmaller perſpiration, and little tendency to putrefaction.

Of more importance, however, is the following than the former queſtion, viz. *In what proportion animal and vegetable food ought to be mixed?*

1. *Animal* food certainly gives moſt ſtrength to the ſyſtem. It is a known aphoriſm of Sanctorius, that *pondus addit robur;* which may be explained from the impletion of the blood-veſſels, and giving a proper degree of tenſion for the performance of ſtrong oſcillations. Now animal-food not only goes a greater way in ſupplying fluid, but alſo gives the fluid more denſe and elaſtic. The art of giving the utmoſt ſtrength to the ſyſtem is beſt underſtood by thoſe who breed fighting-cocks. Theſe people raiſe the cocks to a certain weight, which muſt bear a certain proportion to the other parts of the ſyſtem, and which at the ſame time is ſo nicely proportioned, as that, on loſing a few ounces of it, their ſtrength is very conſiderably impaired. Dr Robinſon of Dublin has obſerved, that the force and weight of the ſyſtem ought to be determined by the largeneſs of the heart, and its proportion to the ſyſtem: for a large heart will give large blood-veſſels, while at the ſame time the viſcera are leſs, particularly the liver; which laſt being increaſed in ſize, a greater quantity of fluid is determined into the cellular texture, and leſs into the ſanguineous ſyſtem. Hence we ſee how animal-food gives ſtrength, by filling the ſanguiferous veſſels. What pains we now beſtow on cocks, the ancients did on the Athletæ, by proper nouriſhment bringing them to a great degree of ſtrength and agility. It is ſaid that men were at firſt fed on figs, a proof of which we have from their nutritious quality: however, in this reſpect they were ſoon found to fall far ſhort of animal-food; and thus we ſee, that men, in ſome meaſure, will work in proportion to the quality of their food. The Engliſh labour more than the Scots; and wherever men are expoſed to hard labour, their food ſhould be animal. Animal food, although it gives ſtrength, yet loads the body; and Hippocrates long ago obſerved, that the athletic habit, by a ſmall increaſe, was expoſed to the greateſt hazards. Hence it is only proper for bodily labours, and entirely improper for mental exerciſes; for whoever would keep his mind acute and penetrating, will exceed rather on the ſide of vegetable food. Even the body is oppreſſed with animal-food; a full meal always produces dulneſs, lazineſs, and yawning; and hence the feeding of gameſters, whoſe mind muſt be ready to take advantage, is always performed by avoiding a large quantity of animal-food. Farther, with regard to the ſtrength of the body, animal-food in the firſt ſtage of life is hardly neceſſary to give ſtrength: in manhood, when we are expoſed to active ſcenes, it is more allowable; and even in the decline of life, ſome proportion of it is neceſſary to keep the body in vigour. There are ſome diſeaſes which come on in the decay of life, at leaſt are aggravated by it; among theſe the moſt remarkable is the gout. This, when it is in the ſyſtem, and does not appear with inflammation in the extremities, has pernicious effects there, attacking the lungs, ſtomach, head, &c. Now to determine this to the extremities, a large proportion of animal-food is neceſſary, eſpecially as the perſon is commonly incapable of much exerciſe.

Animal-food, although it gives ſtrength, is yet of many hazards to the ſyſtem, as it produces plethora and all its conſequences. As a ſtimulus to the ſtomach and to the whole ſyſtem, it excites fever, urges the circulation, and promotes the perſpiration. The ſyſtem, however, by the repetition of theſe ſtimuli, is ſoon worn out; and a man who has early uſed the athletic diet, is either early carried off by inflammatory diſeaſes, or, if he takes exerciſe ſufficient to render that diet ſalutary, ſuch an accumulation is made of putreſcent fluids, as in his after-life lays a foundation for the moſt inveterate chronic diſtempers. Therefore it is to be queſtioned, whether we ſhould deſire this high degree of bodily ſtrength, with all the inconveniences and dangers attending it. Thoſe who are chiefly employed in mental reſearches, and not expoſed to too much bodily labour, ſhould always avoid an exceſs of animal-food. There is a diſeaſe which ſeems to require animal-food, viz. the hyſteric or hypochondriac; and which appears to be very much a-kin to the gout, affecting the alimentary canal. All people affected with this diſeaſe are much diſpoſed to aceſcency; which ſometimes goes ſo far, that no other vegetable but bread can be taken in, without occaſioning the worſt conſequences. Here then we are obliged to preſcribe an animal-diet, even to thoſe of very weak organs; for it generally obviates the ſymptoms. However, ſeveral inſtances of ſcurvy in exceſs have been produced by a long-continued uſe of this diet, which it is always unlucky to be obliged to preſcribe; and when it is abſolutely neceſſary to preſcribe, it ſhould be joined with as much of the vegetable as poſſible, and when a cure is performed we ſhould gradually recur to that again.

2. Next, let us conſider the *vegetable* diet. The chief inconveniency of this is difficulty of aſſimilation; which, however, in the vigorous and exerciſed, will not be liable to occur. In warm climates, the aſſimilation of vegetable aliment is more eaſy, ſo that *there* it may be more uſed, and when joined to exerciſe gives a pretty tolerable degree of ſtrength and vigour; and though the general rule be in favour of *animal* diet, for giving ſtrength, yet there are many inſtances of their being remarkably produced from vegetable. Vegetable diet has this advantage, that it whets the appetite, and that we can hardly ſuffer from a full meal of it. Beſides the diſorders it is liable to produce in the *primæ viæ*, and its falling ſhort to give ſtrength, there ſeem to be no bad conſequences it can produce in the blood-veſſels; for there is no inſtance where its peculiar acrimony was ever carried there, and it is certainly leſs putrifiable than animal food; nor, without the utmoſt indolence, and a ſharp appetite, does it give plethora, or any of its conſequences: ſo that we cannot here but conclude, that a large proportion of vegetable food is uſeful for the generality of mankind.

There is no error in this country more dangerous, or more common, than the neglect of bread: for it is the ſafeſt of vegetable aliment, and the beſt corrector of animal-food; and, by a large proportion of this alone, its bad conſequences, when uſed in a hypochondriac ſtate, have been obviated. The French apparently have as much animal-food on their tables as the Britons; and yet, by a greater uſe of bread and the dried acid fruits, its bad effects are prevented; and therefore bread ſhould be particularly uſed* by the Engliſh, as they are ſo voracious of animal food. Vegetable food is not only neceſſary to ſecure health, but long life: and, as we have ſaid, in infancy and youth we ſhould be confined to it moſtly; in manhood, and decay of life, uſe animal food; and, near the end, vegetable again.

There is another queſtion much agitated, viz. *What are the effects of variety in food?* Is it neceſſary and allowable, or univerſally hurtful? Variety of a certain kind ſeems neceſſary; as vegetable and animal foods have their mutual advantages, tending to correct each other. Another variety, which is very proper, is that of liquid and ſolid food, which ſhould be ſo managed as to temper each other; and liquid food, eſpecially of the vegetable kind, is too ready to paſs off before it is properly aſſimilated, while ſolid food makes a long ſtay. But this does not properly belong to the queſtion, whether variety of the ſame kind is neceſſary or proper, as in animal-foods, beef, fiſh, fowl, &c. It doth not appear that there is any inconvenience ariſing from this mixture, or difficulty of aſſimilation, provided a moderate quantity be taken. When any inconvenience does ariſe, it probably proceeds from this, that one of the particular ſubſtances in the mixture, when taken by itſelf, would produce the *ſame effect;* and, indeed, it would appear, that this effect is not *heightened* by the mixture, but probably *obviated* by it. There are few exceptions to this, if any, *e. g.* taking a large proportion of aceſcent ſubſtances with milk. The coldneſs, &c. acidity, flatulency, &c. may appear; and it is poſſible that the coagulum, from the aceſcency of the vegetables, being ſomewhat ſtronger induced, may give occaſion to too long retention in the ſtomach, and to acidity in too great degree. Again, the mixture of fiſh and milk often occaſions inconveniencies. The theory of this is difficult, though, from univerſal conſent, it muſt certainly be juſt. Can we ſuppoſe that fiſh gives occaſion to ſuch a coagulum as runnet? If it does ſo, it may produce bad effects. Beſides, fiſhes approach ſomewhat to vegetables, in giving little ſtimulus; and are accuſed of the ſame bad effects as theſe, *viz.* bringing on the cold fit of fever.

Thus much may be ſaid for variety. But it alſo has its diſadvantages, provoking to gluttony; this, and the art of cookery, making men take in more than they properly can digeſt: and hence, perhaps, very juſtly, phyſicians have univerſally almoſt preferred ſimplicity of diet; for, in ſpite of rules, man's eating will only be meaſured by his appetite, and ſatiety is ſooner produced by *one* than by *many* ſubſtances. But this is ſo far from being an argument againſt variety, that it is one for it, as the only way of avoiding a full meal of animal-food, and its bad effects, is by preſenting a quantity of vegetables. Another mean of preventing the bad effects of animal-food, is to take a large proportion of liquid; and hence the bad effects of animal-food are leſs felt in Scotland, on account of their drinking much with it, and uſing broths, which are at once excellent correctors of animal-food and preventives of gluttony.

WITH regard to the differences between ANIMAL FOODS, properly ſo called, the firſt regards their ſolubility, depending on a lax or firm texture of their different kinds.

I. SOLUBILITY of animal food ſeems to deſerve leſs attention than is commonly imagined; for there are many inſtances of perſons of a weak ſtomach incapable of breaking down the texture of vegetables, or even of diſſolving a light pudding, to whom hung beef, or a piece of ham, was very grateful and eaſily digeſted. None of the theories given for the ſolution of animal-food in the human ſtomach ſeem to have explained that proceſs ſufficiently. Long ago has been diſcarded the ſuppoſition of an active corroſive menſtruum there; and alſo the doctrine of trituration, for which, indeed, there ſeems no mechaniſm in the human body; and, till lately, phyſicians commonly agreed with Boerhaave in ſuppoſing nothing more to be neceſſary than a watery menſtruum, moderate heat, and frequent agitation. This will account for ſolution in ſome caſes, but not entirely. Let us try to imitate it out of the body with the ſame circumſtances, and in ten times the time in which the food is diſſolved in the ſtomach we ſhall not be able to bring about the ſame changes. Take the coagulated white of an egg, which almoſt every body can eaſily digeſt, and yet no artifice ſhall be able to diſſolve it. Hence, then, we are led to ſeek another cauſe for ſolution, *viz.* fermentation; a notion, indeed, formerly embraced, but, on the introduction of mechanical philoſophy, induſtriouſly baniſhed, with every other ſuppoſition of that proceſs taking place at all in the animal œconomy.

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* See article BREA

Many of the ancients imagined this fermentation to be putrefactive. But this we deny, as an acid is produced; though hence the fermentation might be reckoned the vinous, which, however, ſeems always to be morbid. Neither, indeed, is the fermentation purely acetous, but modified by putreſcence; for Pringle has obſerved, that animal-matters raiſe and even expede the acetous proceſs. The fermentation, then, in the ſtomach is of a mixed nature, between the acetous and putrefactive, mutually modifying each other; though, indeed, in the inteſtines, ſomewhat of the putrefactive ſeems to take place, as may be obſerved from the ſtate of the fæces broke down, and from the little diſpoſition of ſuch ſubſtances to be ſo, which are not liable to the putrefactive proceſs, as the firmer parts of vegetables, &c. Upon this view ſolution ſeems to be extremely eaſy, and thoſe ſubſtances to be moſt eaſily broke down which are moſt ſubject to putrefaction. See ANATOMY, n° 368.—and GASTRIC *Juice*.

But ſolution alſo depends on other circumſtances, and hence requires a more particular regard.

1. There is a difference of ſolubility with reſpect to the manducation of animal-food, for which bread is extremely neceſſary, in order to keep the more ſlippery parts in the mouth till they be properly comminuted *. From want of proper manducation perſons are ſubject to eructations; and this more frequently from the firm vegetable foods, as apples, almonds, &c. than from the animal, though, indeed, even from animal food, very tendinous, or ſwallowed in unbroken maſſes, ſuch ſometimes occur. Manducation is ſo much connected with ſolution, that ſome, from imperfectly performing that, are obliged to belch up their food, remanducate it, and ſwallow it again before the ſtomach can diſſolve it, or proper nouriſhment be extracted. Another proof of our regard to ſolubility, is our rejecting the firmer parts of animal food, as bull-beef, and generally carnivorous animals.

2. Its effects with regard to ſolubility, ſeem alſo to be the foundation of our choice between *fat* and *lean*, *young* and *old meats*. In the *lean*, although, perhaps, a ſingle fibre might be ſufficiently tender, yet theſe, when collected in *faſciculi*, are very firm and compact, and of difficult ſolution; whereas in the *fat* there is a greater number of veſſels, a greater quantity of juice, more interpoſition of cellular ſubſtance, and conſequently more ſolubility. Again, in young animals, there is probably the ſame number of fibres as in the older, but theſe more connected: whereas, in the older, the growth depending on the ſeparation of theſe, and the increaſe of veſſels and cellular ſubſtance, the texture is leſs firm and more ſoluble; which qualities, with regard to the ſtomach, are at that time too increaſed, by the increaſed alkaleſcency of the animal. To this alſo may be referred our choice of caſtrated animals, *viz.* on account of their diſpoſition to fatten after the operation.

3. It is with a view to the ſolubility, that we make a choice between meats recently killed, and thoſe which have been kept for ſome time. As ſoon as meat is killed, the putrefactive proceſs begins; which commonly we allow to proceed for a little, as that proceſs is the moſt effectual breaker down of animal matters, and a great aſſiſtance to ſolution. The length of time during which meat ought to be kept, is proportioned to the meat's tendency to undergo the putrid fermentation, and the degree of thoſe circumſtances which favour it: Thus in the Torrid Zone, where meat cannot be kept above four or five hours, it is uſed much more recent than in theſe northern climates.

4. *Boiled* or *roaſted* meats create a difference of ſolution. By boiling we extract the juices interpoſed between the fibres, approximate them more to each other, and render them of more difficult ſolubility; which is increaſed too by the extraction of the juices, which are much more alkaleſcent than the fibres: but when we want to avoid the ſtimulus of alkaleſcent food, and the quick ſolution, as in ſome caſes of diſeaſe, the roaſted is not to be choſen. Of roaſted meat it may be aſked, which are more proper, thoſe which are moſt or leaſt roaſted? That which is leaſt done is certainly the moſt ſoluble: even raw meats are more ſoluble than dreſſed, as Dr Cullen was informed by a perſon who from neceſſity was obliged, for ſome time, to eat ſuch. But at the ſame time that meats little done are very ſoluble, they are very alkaleſcent; ſo that, wherever we want to avoid alkaleſcency in the *primæ viæ*, the moſt roaſted meats ſhould be choſen. Thoſe who throw away the broths of boiled meat do very improperly; for, beſides their ſupplying a fluid, from their greater alkaleſcency they increaſe the ſolubility of the meat. Here we ſhall obſerve, that pure blood has been thought inſoluble. Undoubtedly it is very nutritious; and though out of the body, like the white of eggs, it ſeems very inſoluble, yet, like that too, in the body it is commonly eaſily digeſted. Moſes very properly forbad it the Iſraelites, as, in warm countries, it is highly alkaleſcent; and even here, when it was uſed in great quantity, the ſcurvy was more frequent: but to a moderate uſe of it, in theſe climates, no ſuch objection takes place.

5. Solubility is varied from another ſource, viz. viſ-

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* See the article BREAD.

cidity of the juice of aliment. Young animals, then, appear more ſoluble than old, not only on account of the compaction and firmneſs of texture in the latter, but alſo their greater viſcidity of juice. And nothing is more common, than to be longer oppreſſed from a full meal of veal, than from the ſame quantity of beef, &c. Upon account, too, of their greater viſcidity of juice, are the tendinous and ligamentous parts of animals longer retained than the purely muſcular, as well as on account of their firmneſs of texture. Even fiſhes, whoſe muſcular parts are exceedingly tender, are, on account of their gluey viſcoſity, longer of ſolution in the ſtomach. And eggs, too, which are exceedingly nouriſhing, have the ſame effect, and cannot be taken in great quantity: For the ſtomach is peculiarly ſenſible to gelatinous ſubſtances; and by this means has nature perhaps taught us, as it were by a ſort of inſtinct, to limit ourſelves in the quantity of ſuch nutritive ſubſtances.

6. With regard to ſolution, we muſt take in the oils of animal-food; which, when tolerably pure, are the leaſt putreſcent part of it, and, by diminiſhing the coheſion of the fibres, render them more ſoluble. On this laſt account is the lean of fat meat more eaſily diſſolved than other lean. But when the meat is expoſed to much heat, this oil is ſeparated, leaving the ſolid parts leſs eaſily ſoluble, and becoming itſelf empyreumatic, ranceſcent, and of difficult mixture in the ſtomach. Fried meats, from the reaſons now given, and baked meats, for the ſame, as well as for the tenacity of the paſte, are preparations which diminiſh the ſolubility of the food. From what has been ſaid, the preparation of food by fattening it, and keeping it for ſome time after killed, altho' it may adminiſter to gluttony, will yet, it muſt be confeſſed, increaſe the ſolution of the food.

II. The ſecond difference of animal-food is with regard to ALKALESCENCY.

Of this we have taken a little notice already under the head of ſolubility.

1. From their too great alkaleſcency we commonly avoid the carnivorous animals, and the *feræ;* and chooſe rather the granivorous. Some birds, indeed, which live on inſects, are admitted into our food; but no man, without *nauſea*, can live upon theſe alone for any length of time. Fiſhes, too, are an exception to this rule, living almoſt univerſally on each other. But in theſe the alkaleſcency does not proceed ſo far; whether from the viſcidity of their juice, their want of heat, or ſome peculiarity in their œconomy, is not eaſy to determine.

2. Alkaleſcency is determined by difference of age. The older animals are always more alkaleſcent than the young, from their continual progreſs to putrefaction. Homberg always found, in his endeavours to extract an acid from human blood, that more was obtained from the young than from the old animals.

3. A third circumſtance which varies the alkaleſcency of the food, is the wildneſs or tameneſs of the animal; and this again ſeems to depend on its exerciſe. Dr Cullen knew a gentleman who was fond of cats for food: but he always uſed to feed them on vegetable food, and kept them from exerciſe; and in the ſame manner did the Romans rear up their rats, when intended for food. In the ſame way the fleſh of the partridge and the hen ſeems to be much the ſame; only, from its being more on the wing, the one is more alkaleſcent than the other. Again, tame animals are commonly uſed without their blood; whereas the wild are commonly killed in their blood, and upon that account, as well as their greater exerciſe, are more alkaleſcent.

4. The alkaleſcency of food may be determined from the quantity of volatile ſalt it affords. The older the meat is, it is found to give the greater proportion of volatile ſalt.

5. The alkaleſcency of aliment may alſo, in ſome meaſure, be determined from its colour, the younger animals being whiter and leſs alkaleſcent. We alſo take a mark from the colour of the gravy poured out, according to the redneſs of the juices judging of the animal's alkaleſcency.

6. The reliſh of food is found to depend much on its alkaleſcency, as does alſo the ſtimulus it gives and the fever it produces in the ſyſtem. Theſe effects are alſo complicated with the viſcidity of the food, by which means it is longer detained in the ſtomach, and the want of alkaleſcency ſupplied.

Having mentioned animal food as differing in ſolubility and alkaleſcency, which often go together in the ſame ſubject, we come to the third difference, viz.

III. QUANTITY of Nutriment. Which is either abſolute or relative: abſolute with reſpect to the quantity it really contains, ſufficient powers being given to extract it; relative, with reſpect to the aſſimilatory powers of thoſe who uſe it. The abſolute nutriment is of ſome conſequence; but the relative, in the robuſt and healthy, and except in caſes of extraordinary weakneſs, may, without much inconvenience, be diſregarded. In another caſe is the quantity of nouriſhment relative, viz. with regard to its *perſpirability;* for if the food is ſoon carried off by the excretions, it is the ſame thing as if it contained a leſs proportion of nouriſhment. For, giving more fluid, that which is longer retained affords moſt; and, for the repair of the ſolids, that retention alſo is of advantage. Now gelatinous ſubſtances are long retained; and are, beſides, animal ſubſtances themſelves, diſſolved: ſo that, both abſolutely and relatively, ſuch ſubſtances are nutritious. Of this kind are eggs, ſhell-fiſh, &c. In adults, though it is diſputed whether their ſolids need any repair, yet, at any rate, at this period, fluid is more required; for this purpoſe the alkaleſcent foods are moſt proper, being moſt eaſily diſſolved. They are, at the ſame time, the moſt perſpirable; on one hand that alkaleſcency leading to diſeaſe, while on the other their perſpirability obviates it. Adults, therefore, as writers juſtly obſerve, are better nouriſhed on the alkaleſcent; the young and growing, on gelatinous foods. All this leads to a compariſon of young and old meats; the firſt being more gelatinous, and the laſt more alkaleſcent. This, however, by experience, is not yet properly aſcertained. Mr Geoffroy is the only perſon who has been taken up with the analyſis of foods. See *Memoirss de l'Academie*, l'an 1731 & 1732. His attempt was certainly laudable, and in ſome reſpects uſefully performed; but, in general, his experiments were not ſufficiently repeated, nor are, indeed, ſufficiently accurate. He has not been on his guard againſt the various circumſtances which affect meats; the cow kind liking a moiſt ſucculent herbage, which is not to be got in warm climates; while the ſheep are fond of a dry food, and thrive beſt there. Again, ſome of his experiments ſeem contradictory. He ſays, that veal gives more ſolution than beef, while lamb gives leſs than mutton, which is much to be doubted. If both he and Sanctorius had examined Engliſh beef, the reſult, probably, would have been very different as to its perſpirability, &c. Beſides, Mr Geoffroy has only analiſed beef and veal when raw; has made no proper circumſtantial compariſons between quadrupeds and birds; and has examined theſe laſt along with their bones, and not their muſcles, &c. by themſelves, as he ought to have done, &c. If a ſet of experiments of this kind were properly and accurately performed, they might be of great uſe; but, at preſent, for the purpoſe of determining our preſent ſubject, we muſt have recourſe to our alkaleſcency, ſolubility &c.

IV. The fourth difference of animal foods, is, *The* NATURE *of the* FLUIDS *they afford*. The whole of this will be underſtood, from what has been ſaid on alkaleſcency; the fluid produced being more or leſs denſe and ſtimulating, in proportion as that prevails.

V. The fifth difference of animal-foods is with reſpect to their

PERSPIRABILITY. The ſum of what can be ſaid on this matter is this, that ſuch foods as promote an accumulation of fluid in our veſſels, and diſpoſe to plethora, are the leaſt perſpirable, and commonly give moſt ſtrength; that the more alkaleſcent foods are the moſt perſpirable, though the viſcid and leſs alkaleſcent may attain the ſame property by long retention in the ſyſtem. The authors on perſpirability have determined the perſpiration of foods as imperfectly as Mr Geoffroy has done the ſolubility, and in a few caſes only. We muſt not lay hold on what Sanctorius has ſaid on the perſpirability of mutton, becauſe he has not examined, in the ſame way, other meats in their perfect ſtate; far leſs on what Keil ſays of oyſters, as he himſelf was a valetudinarian, and conſequently an unfit ſubject for ſuch experiments, and probably of a peculiar temperament.

As to the effects of Food on the MIND, we have already hinted at them above. It is plain, that delicacy of feeling, livelineſs of imagination, quickneſs of apprehenſion, and acuteneſs of judgment, more frequently accompany a weak ſtate of the body. True it is, indeed, that the ſame ſtate is liable to timidity, fluctuation, and doubt; while the ſtrong have that ſteadineſs of judgment, and firmneſs of purpoſe, which are proper for the higher and more active ſcenes of life. The moſt valuable ſtate of the mind, however, appears to reſide in ſomewhat leſs firmneſs and vigour of body. Vegetable aliment, as never over-diſtending the veſſels or loading the ſyſtem, never interrupts the ſtronger motions of the mind; while the heat, fulneſs, and weight, of animal-food, are an enemy to its vigorous efforts. Temperance, then, does not ſo much conſiſt in the quantity, for that always will be regulated by our appetite, as in the quality, viz. a large proportion of vegetable aliment.

FOOD *of Plants*. See AGRICULTURE, n° 1,—6. and PLANTS; alſo the article COMPOSTS.

FOOL, according to Mr Locke, is a perſon who makes falſe concluſions from right drinciples; whereas a madman, on the contrary, draws right concluſions from wrong principles.

FOOL-*Stones*, in botany. See ORCHIS.

FOOT, a part of the body of moſt animals whereon they ſtand, walk, &c. See ANATOMY, n° 62.

FOOT, in the Latin and Greek poetry, a metre or meaſure, compoſed of a certain number of long and ſhort ſyllables.

Theſe feet are commonly reckoned 28: of which ſome are ſimple, as conſiſting of two or three ſyllables, and therefore called *diſſyllabic* or *triſyllabic feet*; others are compound, conſiſting of four ſyllables, and are therefore called *tetraſyllabic feet*.

The diſſylabic feet are four in number, viz. the pyrrhichius, ſpondeus, iambus, and trocheus. See PYRRHICHIUS, &c.

The triſyllabic feet are eight in number, viz. the dactylus, anapæſtus, tribrachys, moloſſus, amphibrachys, amphimacer, bacchius, and antibacchius. See DACTYL, &c.

The tetraſyllabic are in number 16, viz. the proceleuſmaticus, diſpondeus, choriambus, antiſpaſtus, diiambus, dichoreus, ionicus a majore, ionicus a minore, epitritus primus, epitritus ſecundus, epitritus tertius, epitritus quartus, pæon primus, pæon ſecundus, pæon tertius, and pæon quartus. See PROCLEUSMATICUS, &c.

FOOT, in Engliſh poetry. See POETRY, n° 117, 175.

FOOT is alſo a long meaſure conſiſting of 12 inches.

Geometricians divide the foot into 10 digits, and the digit into 10 lines.

FOOT *Square*, is the ſame meaſure both in breadth and length, containing 144 ſquare or ſuperficial inches.

Cubic or *Solid* FOOT, is the ſame meaſure in all the three dimenſions, length, breadth, and depth or thickneſs, containing 1728 cubic inches.

FOOT *of a Horſe*, in the menage, the extremity of the leg, from the coronet to the lower part of the hoof.

FOOT-*Level*, among artificers, an inſtrument that ſerves as a foot-rule, a ſquare, and a level. See LEVEL, RULE, and SQUARE.

FOOTE (Samuel, Eſq;), the modern Ariſtophanes, was born at Truro, in Cornwall; and was deſcended from a very ancient family. His father was member of parliament for Tiverton, in Devonſhire; and enjoyed the poſt of commiſſioner of the prize-office and fine-contract. His mother was heireſs of the Dinely and Goodere families. In conſequence of a fatal miſunderſtanding between her two brothers, Sir John Dinely Goodere, bart. and Samuel Goodere, eſq; captain of his majeſty's ſhip the Ruby, which ended in the death of both, a conſiderable part of the Goodere eſtate, which was better than 5000 l. *per annum*, deſcended to Mr Foote.

He was educated at Worceſter college, Oxford, which owed its foundation to Sir Thomas Cookes Winford, bart. a ſecond couſin of our author's. On leaving the univerſity, he commenced ſtudent of law in the Temple; but, as the dryneſs of this ſtudy did not ſuit the livelineſs of his genius, he ſoon relinquiſhed it. He married a young lady of a good family and ſome fortune; but, their tempers not agreeing, a perfect harmony did not long ſubſiſt between them. He now lanched into all the faſhionable foibles of the age, gaming not excepted; and in a few years ſpent his whole fortune. His neceſſities led him to the ſtage, and he made his firſt appearance in the character of Othello. He next performed Fondlewife with much more applauſe; and this, indeed, was ever after one of his capital parts. He attempted Lord Foppington likewiſe, but prudently gave it up. But, as Mr Foote was never a capital actor in the plays of others, his ſalary was very unequal to his gay and extravagant turn; and he contracted debts which forced him to take refuge within the verge of the court.

He relieved his neceſſities by a very laughable ſtratagem. Sir Fr—s D—l—l had long been his intimate friend, and had diſſipated his fortune by ſimilar extravagance. Lady N-ſſ-u P—l-t, who was likewiſe an intimate acquaintance of Foote's, and who was exceeding rich, was fortunately at that time bent upon a matrimonial ſcheme. Foote ſtrongly recommended to her to conſult upon this momentous affair the conjurer in the Old Bailey, whom he repreſented as a man of ſurpriſing ſkill and penetration. He employed an acquaintance of his own to perſonate the conjurer, who depicted Sir Fr—s D—l—l at full length; deſcribed the time when, the place where, and the dreſs in which, ſhe would ſee him. The lady was ſo ſtruck with the coincidence of every circumſtance, that ſhe married D—l—l in a few days. For this ſervice Sir Francis ſettled an annuity upon Foote; and this enabled him once more to emerge from obſcurity.

In 1747 he opened the little theatre in the Haymarket, taking upon himſelf the double character of author and performer; and appeared in a dramatic piece of his own compoſing, called the *Diverſions of the Morning*. This piece conſiſted of nothing more than the exhibition of ſeveral characters well known in real life, whoſe manner of converſation and expreſſion this author very happily hit off in the diction of his drama, and ſtill more happily repreſented on the ſtage, by an exact and moſt amazing imitation, not only of the manner and tone of voice, but even of the very perſons, of thoſe whom he intended to take off. In this performance, a certain phyſician, Dr L---n, well known for the oddity and ſingularity of his appearance and converſation, and the celebrated Chevalier Taylor, who was at that time in the height of his popularity, were made objects of Foote's ridicule; the latter, indeed, very deſervedly: and, in the concluding part of his ſpeech, under the character of a theatrical director, Mr Foote took off, with great humour and accuracy, the ſeveral ſtyles of acting of every principal performer on the Engliſh ſtage.

This performance at firſt met with ſome oppoſition from the civil magiſtrates of Weſtminſter, under the ſanction of the act of parliament for limiting the number of playhouſes, as well as from the jealouſy of one of the managers of Drury-lane playhouſe; but, the author being patronized by many of the principal nobility, and other perſons of diſtinction, this oppoſition was over-ruled: and, having altered the title of his performance, Mr Foote proceeded, without further moleſtation, to give *Tea in a morning* to his friends, and repreſented it through a run of 40 mornings to crowded and ſplendid audiences.

The enſuing ſeaſon he produced another piece of the ſame kind, which he called *An Auction of Pictures*. In this performance he introduced ſeveral new and popular characters; particularly Sir Thomas de Veil, then the acting juſtice of piece for Weſtminſter, Mr Cock the celebrated auctioneer, and the equally famous Orator Henley. This piece alſo had a very great run.

His *Knights*, which was the produce of the enſuing ſeaſon, was a performance of ſomewhat more dramatic regularity: but ſtill, although his plot and characters ſeemed leſs immediately perſonal, it was apparent that he kept ſome particular real perſons ſtrongly in his eye in the performance; and the town took upon themſelves to fix them where the reſemblance appeared to be the moſt ſtriking.

Thus Mr Foote continued, from time to time, to ſelect, for the entertainment of the public, ſuch characters, as well general as individual, as ſeemed moſt likely to engage their attention. His dramatic pieces, excluſive of the interlude called *Piety in Pattens*, are as follow: Taſte, The Knights, The Author, The Engliſhman in Paris, The Engliſhman Returned from Paris, The Mayor of Garrat, The Liar, The Patron, The Minor, The Orators, The Commiſſary, The Devil upon Two Sticks, The Lame Lover, The Maid of Bath, The Nabob, The Cozeners, The Capuchin, The Bankrupt, and an unfiniſhed comedy called The Slanderer.

All theſe works are only to be ranked among the *petites pieces* of the theatre. In the execution they are ſomewhat looſe, negligent, and unfiniſhed; the plots are often irregular, and the cataſtrophes not always concluſive: but, with all theſe deficiencies, they contain more ſtrength of character, more ſtrokes of keen ſatire, and more touches of temporary humour, than are to be found in the writings of any other modern dramatiſt. Even the language ſpoken by his characters, incorrect as it may ſometimes ſeem, will, on a cloſer examination, be found entirely dramatical; as it abounds with thoſe natural minutiæ of expreſſion which frequently form the very baſis of character, and which render it the trueſt mirror of the converſation of the times in which he wrote.

In the year 1766, being on a party of pleaſure with the late duke of York, lord Mexborough, and Sir Francis Delaval, Mr Foote had the misfortune to break his leg, by a fall from his horſe; in conſequence of which, he was compelled to undergo an amputation. This accident ſo ſenſibly affected the duke, that he made a point of obtaining for Mr Foote a patent for life; whereby he was allowed to perform, at the little theatre in the Haymarket, from the 15th of May to the 15th of September every year.

He now became a greater favourite of the town than ever: his very laughable pieces, with his more laughable performances, conſtantly filled his houſe; and his receipts were ſome ſeaſons almoſt incredible. Parſimony was never a vice to be aſcribed to Mr Foote; his hoſpitality and generoſity were ever conſpicuous; he was viſited by the firſt nobility, and he was ſometimes honoured even by royal gueſts.

The attack made upon his character by one of his domeſtics, whom he had diſmiſſed for miſbehaviour, is too well known to be particularized here. Suffice it to ſay, he was honourably acquitted of that charge:

but it is believed by ſome, that the ſhock which he received from it accelerated his death; others pretend, that his literary altercation with a certain *then* ducheſs, or rather her agents, much affected him, and that from that time his health declined. It is probable, however, that his natural volatility of ſpirits could ſcarcely fail to ſupport him againſt all impreſſions from either of theſe quarters.

Mr Foote, finding his health decline, entered into an agreement with Mr Colman, for his patent of the theatre; according to which, he was to receive from Mr Colman 1600 l. *per annum*, beſides a ſtipulated ſum whenever he choſe to perform. Mr Foote made his appearance two or three times laſt ſummer, in ſome of the moſt admired characters; but being ſuddenly affected with a paralytic ſtroke one night whilſt upon the ſtage, he was compelled to retire. He was adviſed to bathe; and accordingly repaired to Brighthelmſtone, where he apparently recovered his former health and ſpirits, and was what is called the *fiddle of the company* who reſorted to that agreeable place of amuſement. A few weeks before his death, he returned to London; but, by the advice of his phyſicians, ſet out with an intention to ſpend the winter at Paris and in the ſouth of France. He had got no farther than Dover, when he was ſuddenly attacked by another ſtroke of the palſy, which in a few hours terminated his exiſtence. He died on the 21ſt of October 1777, in the 56th year of his age, and was privately interred in the cloiſters of Weſtminſter-abbey.

FORAMEN, in anatomy, a name given to ſeveral apertures or perforations in divers parts of the body; as, 1. The external and internal foramina of the cranium or ſkull. 2. The foramina in the upper and lower jaw. 3. Foramen lachrymale. 4. Foramen membranæ tympani. See ANATOMY.

FORAMEN *Ovale*, an oval aperture or paſſage thro' the heart of a fetus, which cloſes up after birth. It ariſes above the coronal vein, near the right auricle, and paſſes directly into the left auricle of the heart, ſerving for the circulation of the blood in the fetus, till ſuch time as the infant breathes, and the lungs are open; it being generally reckoned one of the temporary parts of the fetus, wherein it differs from an adult; although almoſt all anatomiſts, Mr Cheſelden excepted, aſſure us, that the foramen ovale has ſometimes been found open in adults. See FOETUS.

FORBES (Patrick), biſhop of Aberdeen, was born in 1654, when the affairs of the church of Scotland were in much confuſion; to the ſettlement of which he greatly contributed. As chancellor of the univerſity of Aberdeen, he improved that ſeat of learning by repairing the fabric, augmenting the library, and reviving the profeſſorſhips. He publiſhed a *Commentary on the Revelations*, at London, in 1613; and died in 1635.

FORBES (John), the ſon of Patrick, but of much more extenſive learning than his father, was perhaps excelled by none of his age, which will be allowed by thoſe who read his *Hiſtorical and Theological Inſtitutes*. He was biſhop of Aberdeen; but was expelled by the Covenanters, and forced to fly beyond ſea. He continued in Holland two years; and, upon his return, lived private on his eſtate at Corſe, until he died in 1648. An edition of all his works was printed in two vols folio at Amſterdam in 1703.

FORBES (William), a learned biſhop of Edinburgh, born in 1585. His ill-health, and the anti-epiſcopal diſpoſition of the Scots, confined him chiefly to a retired life: but when Charles I. in 1633, founded an epiſcopal church at Edinburgh, he thought none more worthy to fill the ſee than Mr Forbes; who, however, died three months after his conſecration, in 1634. Though very able and learned, he publiſhed nothing; but wrote a treatiſe to pacify controverſies, which was printed at London 24 years after his death.

FORBES (Duncan, Eſq; of Culloden), was born in the year 1685. In his early life, he was brought up in a family remarkable for hoſpitality; which perhaps led him afterwards to a freer indulgence in ſocial pleaſures. His natural diſpoſition inclined him to the army: but, as he ſoon diſcovered a ſuperior genius, by the advice of his friends he applied himſelf to letters. He directed his ſtudies particularly to the civil law; in which he made a quick progreſs, and in 1709 was admitted an advocate. From 1722 to 1737, he repreſented in parliament the boroughs of Inverneſs, Fortroſe, Nairn, and Forres. In 1725, he was made king's advocate; and Lord Preſident of the Court of Seſſion, in 1737. In the troubles of 1715 and 1745, he eſpouſed the royal cauſe; but with ſo much prudence and moderation did he conduct himſelf at this delicate conjuncture, that not a whiſper was at any time heard to his prejudice. The glory he acquired in advancing the proſperity of his country, and in contributing to re-eſtabliſh peace and order, was the only reward of his ſervices. He had even impaired, and almoſt ruined, his private fortune in the cauſe of the public; but government did not make him the ſmalleſt recompenſe. The miniſter, with a meanneſs for which it is difficult to account, deſired to have a ſtate of his diſburſements. He was ſo much ſhocked at the rudeneſs of this treatment, that he left the miniſter without making any reply. Throughout the whole courſe of his life he had a lively ſenſe of religion, without the leaſt taint of ſuperſtition; and his charity was extended to every ſect and denomination of religioniſts indiſcriminately. He was well verſed in the Hebrew language; and wrote, in a flowing and oratorial ſtyle, concerning religion natural and revealed, ſome important diſcoveries in theology and philoſophy, and concerning the ſources of incredulity. He died in 1747, in the 62d year of his age; and his works have ſince been publiſhed in two volumes octavo.

FORCE, in mechanics, denotes the cauſe of the change in the ſtate of a body when, being at reſt, it begins to move, or has a motion which is either not uniform or not direct. See MECHANICS.

Central FORCES. See MECHANICS.

Centrifugal FORCE. See CENTRIFUGAL.

FORCE, in law, ſignifies any unlawful violence offered to things or perſons, and is divided into ſimple and compound. *Simple force* is what is ſo committed, that it has no other crime attending it; as where a perſon by force enters on another's poſſeſſion, without committing any other unlawful act. *Compound force*, is where ſome other violence is committed with ſuch an act which of itſelf alone is criminal; as if one enters by force into another's houſe, and there kills a perſon, or raviſhes a woman. There is likewiſe a force implied in law, as in every treſpaſs, reſcue, or diſſeiſin, and an actual force with weapons, number of perſons, &c.—Any perſon may lawfully enter a tavern, inn, or victualling-houſe; ſo may a landlord his tenant's houſe to view repairs, &c. But if, in theſe caſes, the perſon that enters commits any violence or force, the law will intend that he entered for that purpoſe.

FORCEPS, in ſurgery, &c. a pair of ſciſſars for cutting off, or dividing, the fleſhy membranous parts of the body, as occaſion requires. See SURGERY.

FORCIBLE ENTRY, is a violent and actual entry into houſes, or lands; and a forcible detainer, is where one by violence with-holds the poſſeſſion of lands, &c. ſo that the perſon who has a right of entry is barred, or hindered, therefrom.

At common law, any perſon that had a right to enter into lands, &c. might retain poſſeſſion of it by force. But this liberty being abuſed, to the breach of the peace, it was therefore found neceſſary that the ſame ſhould be reſtrained: Though, at this day, he who is wrongfully diſpoſſeſſed of goods may by force retake them. By ſtatute, no perſons ſhall make an entry on any lands or tenements, except where it is given by law, and in a peaceable manner, even tho' they have title of entry, on pain of impriſonment: and where a forcible entry is committed, juſtices of peace are authorized to view the place, and inquire of the force by a jury, ſummoned by the ſheriff of the county; and they may cauſe the tenements &c. to be reſtored, and impriſon the offenders till they pay a fine. Likewiſe a writ of forcible entry lies, where a perſon ſeized of freehold, is by force put out thereof.

FORCIBLE *Marriage*, of a woman of eſtate, is felony. For by the ſtatute 3 *H.* 7. *c.* 2. it is enacted, "That if any perſons ſhall take away any woman having lands or goods, or that is heir apparent to her anceſtor, by force, and againſt her will, and *marry* or *defile* her; the takers, procurers, abettors and receivers of the woman taken away againſt her will, and knowing the ſame, ſhall be deemed principal felons; but as to procurers and acceſſories, they are, before the offence be committed, to be excluded the benefit of clergy, by 39 *Eliz. c.* 9. The indictment on the ſtatute 3 *H.* 7. is expreſly to ſet forth, that the woman taken away had lands or goods, or was heir apparent; and alſo that ſhe was married or defiled, becauſe no other caſe is within the ſtatute; and it ought to allege that the taking was for lucre. It is no excuſe that the woman at firſt was taken away with her conſent: for if ſhe afterwards refuſe to continue with the offender, and be forced againſt her will, ſhe may from that time properly be ſaid to be taken againſt her will; and it is not material whether a woman ſo taken away be at laſt married or defiled with her own conſent or not, if ſhe were under force at the time; the offender being in both caſes equally within the words of the act.

Jacob's Law Dict.

Thoſe perſons who, after the fact, receive the offender, are but acceſſories after the offence, according to the rules of common law; and thoſe that are only privy to the damage, but not parties to the forcible taking away, are not within the act, *H. P. C.* 119. A man may be indicted for taking away a woman by force in another country; for the continuing of the force in any country, amounts to a forcible taking there. *Ibid.* Taking away any woman-child under the age of 16 years and unmarried, out of the cuſtody and without the conſent of the father or guardian, &c. the offender ſhall ſuffer fine and impriſonment; and if the woman agrees to any contract of matrimony with ſuch perſon, ſhe ſhall forfeit her eſtate during life, to the next of kin to whom the inheritance ſhould deſcend, &. *Stat.* 4 & 5. *P.* & *M. c.* 8. This is a force againſt the parents: and an information will lie for ſeducing a young man or woman from their parents, againſt their conſents, in order to marry them, &c. See MARRIAGE.

FORCING, in gardening, a method of producing ripe fruits from trees before their natural ſeaſon. The method of doing it is this: A wall ſhould be erected ten feet high; a border muſt be marked out on the ſouth ſide of it, of about four feet wide, and ſome ſtakes muſt be faſtened into the ground all along the edge of the border; theſe ſhould be four inches thick. They are intended to reſt the glaſs lights upon, which are to ſlope backwards to the wall, to ſhelter the fruit as there ſhall be occaſion; and there muſt be, at each end, a door to open either way, according as the wind blows. The frame ſhould be made moveable along the wall, that when a tree has been forced one year, the frame may be removed to another, and ſo on, that the trees may each of them be forced only once in three years, at which rate they will laſt a long time. They muſt be always well-grown trees that are choſen for forcing; for young ones are ſoon deſtroyed, and the fruit that is produced from them is never ſo well taſted. The fruits moſt proper for this management are the avant or ſmall white nutmeg, the albemarle, the early newington, and the brown nutmeg peaches; Mr Fairchild's early, and the elrugo and newington nectarines; the maſculine apricot, and the may-duke and may cherry. For grapes, the white and black ſweet-water are the propereſt; and of gooſeberries the Dutch white, the Dutch early green, and the walnut gooſeberry; and the large Dutch white and large Dutch red currants.

The dung, before it is put to the wall, ſhould be laid together in a heap for five or ſix days, that it may heat uniformly through; and when thus prepared it muſt be laid four feet thick at the baſe of the wall, and go ſloping up till it is two feet thick at the top. It muſt be laid at leaſt within three or four inches of the top of the wall; and when it ſinks, as it will ſink two or three feet, more dung muſt be laid on; for the firſt heat will do little more than juſt ſwell the bloſſom-buds. The covering the trees with glaſſes is of great ſervice; but they ſhould be taken off to admit the benefit of gentle ſhowers to the trees, and the doors at the ends ſhould be either left entirely open, or one or both of them opened, and a mat hung before them, at once to let the air circulate and keep off the froſts.

The dung is never to be applied till towards the end of November; and three changes of it will be ſufficient to ripen the cherries, which will be very fine in February. As to the apricots, grapes, nectarines, peaches, and plums, if the weather be milder, the glaſſes are to be opened to let in ſunſhine or gentle ſhowers.

If a row or two of ſcarlet ſtrawberries be planted at the back of the frame, they will ripen in February or the beginning of March; the vines will bloſſom in April, and the grapes will be ripe in June.

It ſhould be carefully obſerved, not to place early and late ripening fruits together, becauſe the heat neceſſary to force the late ones will be of great injury to the early ones after they have fruited.

The maſculine apricot will be ripe in the beginning of April, the early nectarines will be ripe about the ſame time, and the forward ſort of plums by the latter end of that month. Gooſeberries will have fruit fit for tarts in January or February, and will ripen in March; and currants will have ripe fruit in April.

The trees need not be planted ſo diſtant at theſe walls as at others, for they do not ſhoot ſo freely as in the open air; nine feet aſunder is ſufficient. They ſhould be pruned about three weeks before the heat is applied.

FORDOUN (John of), the father of Scottiſh hiſtory, flouriſhed in the reign of Alexander III. towards the end of the 13th century. But of his life there is nothing known with certainty, though there was not a monaſtery that poſſeſſed not copies of his work. The firſt five books of the hiſtory which bears his name were written by him: the reſt were fabricated from materials left by him, and from new collections by different perſons. A manuſcript in vellum of this hiſtorian is in the library of the univerſity of Edinburgh.

FORDYCE (David), an elegant and learned writer of the preſent age, was profeſſor of philoſophy in the Mariſchal college, Aberdeen. He was originally deſigned for the miniſtry; to prepare himſelf for which was the whole aim of his ambition, and for a courſe of years the whole purpoſe of his ſtudies. How well he was qualified to appear in that character, appears from his "Theodorus, a dialogue concerning the art of preaching." After having finiſhed this work, he went abroad on his travels, in order to obtain freſh ſtores of knowledge: but after a ſucceſsful tour through ſeveral parts of Europe, he was unfortunately caſt away in a ſtorm on the coaſt of Holland. Beſides the above work, he wrote Dialogues on education, 8vo. and a Treatiſe of Moral Philoſophy publiſhed in the Preceptor. The third edition of his Theodorus was publiſhed in London, after his untimely death, by his brother the Rev. Mr James Fordyce, an eminent diſſenting miniſter, in 1755.

FORECASTLE *of a* Ship, that part where the foremaſt ſtands. It is divided from the reſt by a bulkhead.

FOREIGN, ſomething extraneous, or that comes from abroad.

Foreign, in the Engliſh law, is uſed in various ſignifications. Thus,

Foreign *Attachment*, is an attachment of the goods of foreigners found within a city or liberty, for the ſatisfaction of ſome citizen to whom the foreigner is indebted; or it ſignifies an attachment of a foreigner's money in the hands of another perſon.

Foreign *Kingdom*, a kingdom under the dominion of a foreign prince.

At the inſtance of an ambaſſador or conſul, an offender againſt the laws here may be ſent for hither from a foreign kingdom to which he hath fled. And, where a ſtranger of Holland, or any foreign country, buys goods at London, for inſtance, and there gives a note under his hand for payment, and then goes away privately into Holland; in that caſe, the ſeller may have a certificate from the lord mayor, on the proof of the ſale and delivery of ſuch goods, whereupon a proceſs will be executed on the party in Holland.

Foreign *Oppoſer* or *Appoſer*, an officer in the exchequer that oppoſes or makes a charge on all ſheriffs, &c. of their green wax; that is to ſay, fines, iſſues, amerciaments, recognizances, &c.

Foreign *Plea*, ſignifies an objection to the judge of the court, by refuſing him as incompetent, becauſe the matter in queſtion is not within his juriſdiction.

Foreign *Seamen*, ſerving two years on board Britiſh ſhips, whether of war, trade, or privateers, during the time of war, ſhall be deemed natural-born ſubjects.

FOREIGNER, the natural-born ſubject to ſome foreign prince.

Foreigners, though made denizens, or naturalized, are diſabled to bear any office in government, to be of the privy-council, or members of parliament, &c. This is by the acts of the ſettlement of the crown. Such perſons as are not freemen of a city or corporation, are alſo called *foreigners*, to diſtinguiſh them from the members of the ſame.

FOREJUDGER, in law, ſignifies a judgment whereby one is deprived, or put by a thing in queſtion.

To be *forejudged the court*, is where an officer or attorney of any court is expelled the ſame for malpractice, or for not appearing to an action on a bill filed againſt him, &c. And where an attorney of the common-pleas is ſued, the plaintiff's attorney delivers the bill to one of the criers of the court, who calls the attorney defendant, and ſolemnly proclaims aloud, that, if he does not appear thereto, he will be forejudged: likewiſe a rule is given by the ſecondary for his appearance: and if the attorney appears not in four days, then the clerk of the warrants ſtrikes ſuch an attorney off the roll of attorneys; after which he becomes liable to be arreſted like any other perſon: but where an attorney is forejudged, he may be reſtored on clearing himſelf from his contumacy, and making ſatisfaction to the plaintiff, &c.

FORELOCKS, in the ſea-language, little flat wedges made with iron, uſed at the ends of bolts, to keep them from flying out of their holes.

FORE-MAST *of a* Ship, a large round piece of timber, placed in her fore-part, or fore-caſtle, and carrying the fore-ſail and fore-top-ſail yards. Its length is uſually $\frac{8}{9}$ of the main-maſt, and the fore-top-gallant-maſt is $\frac{1}{2}$ the length of the fore-top.

Foremast-*Men*, are thoſe on board a ſhip that take in the top-ſails, ſling the yards, furl the ſails, bowſe, trice, and take their turn at the helm, &c.

FOREST, in geography, a huge wood; or, a large extent of ground covered with trees. The word is formed of the Latin *foreſta*, which firſt occurs in the capitulars of Charlemagne, and which itſelf is derived from the German *froſt*, ſignifying the ſame thing. Spelman derives it from the Latin *foris reſtat*, by reaſon foreſts are out of towns. Others derive *foreſta* from *feris*, q. d. *Foreſta, quod ſit tuta ſtatio ferarum*, as being a ſafe ſtation or abode for wild beaſts.

The Caledonian and Hercynian foreſts are famous in hiſtory. The firſt was a celebrated retreat of the ancient Picts and Scots: The latter anciently occupied the greateſt part of Europe; particularly Germany, Poland, Hungary, &c. In Ceſar's time it extended from the borders of Alſatia and Switzerland to Tranſylvania; and was computed 60 days journey long, and 9 broad: ſome parts or cantons thereof are ſtill remaining.

The ancients adored foreſts, and imagined a great part of their gods to reſide therein: temples were frequently built in the thickeſt foreſts; the gloom and ſilence whereof naturally inſpire ſentiments of devotion, and turns mens thoughts within themſelves.

For the like reaſon, the ancient Druids made foreſts the place of their reſidence, performed their ſacrifices, inſtructed their youth, and gave laws therein.

Forest, in law, is defined, by Manwood, a certain territory of woody grounds and fruitful paſtures, privileged for wild-beaſts and fowls of foreſt, chaſe, and warren, to reſt and abide under the protection of the king, for his princely delight; bounded with unremoveable marks and meres, either known by matter of record or preſcription; repleniſhed with wild beaſts of venery or chaſe, with great coverts of vert for the ſaid beaſts; for preſervation and continuance whereof, the vert and veniſon, there are certain particular laws, privileges, and officers.

Foreſts are of ſuch antiquity in England, that, excepting the New-Foreſt in Hampſhire, erected by William the Conqueror, and Hampton Court, erected by Henry VIII. it is ſaid, that there is no record or hiſtory which makes any certain mention of their erection, though they are mentioned by ſeveral writers and in ſeveral of our laws and ſtatutes.—Ancient hiſtorians tell us, "that New-foreſt was raiſed by the deſtruction of 22 pariſh-churches, and many villages, chapels, and manors, for the ſpace of 30 miles together, which was attended with divers judgments on the poſterity of William I. who erected it: for William Rufus was there ſhot with an arrow, and before him Richard the brother of Henry I.; and Henry nephew to Robert, the eldeſt ſon of the Conqueror, did hang by the hair of the head in the boughs of the foreſt, like unto Abſalom." *Blount*.

Beſides the New-foreſt, there are 68 other foreſts in England, 13 chaſes, and more than 700 parks: the four principal foreſts are New-foreſt on the ſea, Shirewood-foreſt on the Trent, Dean-foreſt on the Severn, and Windſor-foreſt on the Thames.

A foreſt in the hands of a ſubject is properly the ſame thing with a Chase; being ſubject to the common law, and not to the foreſt-laws. But a chaſe differs from a foreſt, in that it is not incloſed; and likewiſe, that a man may have a chaſe in another man's ground as well as his own; being indeed the liberty of keeping beaſts of chaſe, or royal game therein, protected even from the owner of the land, with a power of hunting them thereon. See Park.

The manner of erecting a foreſt is thus: Certain commiſſioners are appointed under the great ſeal, who view the ground intended for a foreſt, and fence it round: this commiſſion being returned into chancery, the king cauſeth it to be proclaimed throughout the county where the land lieth, that it is a foreſt; and prohibits all perſons from hunting there, without his leave. Though the king may erect a foreſt on his own ground and waſte, he may not do it on the ground of other perſons without their conſent; and agreements with them for that purpoſe ought to be confirmed by parliament.

A foreſt, ſtrictly taken, cannot be in the hands of any but the king; for no perſon but the king has power to grant a commiſſion to be juſtice in eyre of the foreſt: yet, if he grants a foreſt to a ſubject, and that on requeſt made in the chancery, that ſubject and his heirs ſhall have juſtices of the foreſt, in which caſe the ſubject has a foreſt in law.

A ſecond property of a foreſt is, the courts thereof. See Forest-*Courts*, *infra*.

A third property is the officers belonging to it, as the juſtices, warden, verderer, foreſter, agiſtor, regarder, keeper, bailiff, beadle, &c. See the articles Agistor, Bailiff, Forester, &c.

By the laws of the foreſt, the receivers of treſpaſſers in hunting, or killing of the deer, if they know them to be the king's property, are principal treſpaſſers. Likewiſe, if a treſpaſs be committed in a foreſt, and the treſpaſſer dies, after his death, it may be puniſhed in the life-time of the heir, contrary to common law. Our Norman kings puniſhed ſuch as killed deer in any of their foreſts with great ſeverity; alſo in various manners; as by hanging, loſs of limbs, gelding, and putting out eyes. By *magna charta de foreſta*, it is ordained, that no perſon ſhall loſe life or member for killing the king's deer in foreſts, but ſhall be fined; and if the offender has nothing to pay the fine, he ſhall be impriſoned a year and a day, and then be delivered, if he can give ſecurity not to offend for the future, &c. 9 *Hen. III. c.* 1.

Before this ſtatute, it was felony to hunt the king's deer; and by a late act, perſons armed and diſguiſed, appearing in any foreſt, &c. if they hunt, kill, or ſteal any deer, &c. are guilty of felony. 9 *Geo. I. c.* 22.

He who has any licence to hunt in a foreſt or chace, &c. is to take care that he does not exceed his authority; otherwiſe he ſhall be deemed a treſpaſſer from the beginning, and be puniſhed for that fact, as if he had no licence. See further, the articles Game, and *Game*-Law.

Beaſts of the foreſt are, the hart, hind, buck, doe, boar, wolf, fox, hare, &c. The ſeaſons for hunting whereof are as follow, viz. that of the hart and buck begins at the feaſt of St John Baptiſt, and ends at Holy-rood day; of the hind and doe, begins at Holyrood, and continues till Candlemas; of the boar, from Chriſtmas to Candlemas; of the fox begins at Chriſtmas, and continues till Lady-day; of the hare at Michaelmas, and laſts till Candlemas.

Forest-*Courts*, courts inſtituted for the government of the king's foreſts in different parts of the kingdom, and for the puniſhment of all injuries done to the king's deer or veniſon, to the vert or greenſwerd, and to the covert in which ſuch deer are lodged. Theſe are the courts of attachments, of regard, of ſweinmote, and of juſtice-ſeat. 1. The court of attachments, woodmote, or forty-days court, is to be held before the verderors of the foreſt once in every forty days; and is inſtituted to inquire into all offenders againſt vert and veniſon: who may be attached by their bodies, if taken with the mainour (or *mainœuvre, à manu*) that is, in the very act of killing veniſon or ſtealing wood, or preparing ſo to do, or by freſh and immediate purſuit

Blackſt. Comment.

after the act is done; elſe they muſt be attached by their goods. And in this forty-days court the foreſters or keepers are to bring in the attachments, or preſentments *de viridi et venatione;* and the verderors are to receive the ſame, and to enroll them, and to certify them under their ſeals to the court of juſtice-ſeat or ſweinmote: for this court can only inquire of, but not convict, offenders. 2. The court of regard, or ſurvey of dogs, is to be holden every third year for the lawing or expeditation of maſtiffs; which is done by cutting off the claws of the forefeet, to prevent them from running after deer. No other dogs but maſtiffs are to be thus lawed or expeditated, for none other were permitted to be kept within the precincts of the foreſt; it being ſuppoſed that the keeping of theſe, and theſe only, was neceſſary for the defence of a man's houſe. 3. The court of ſweinmote is to be holden before the verderors, as judges, by the ſteward of the ſweinmote, thrice in every year; the ſweins or freeholders within the foreſt compoſing the jury. The principal juriſdiction of this court is, firſt, to inquire into the oppreſſions and grievances committed by the officers of the foreſt; "*de ſuper-oneratione foreſtariorum, et aliorum miniſtrorum foreſtæ; et de eorum oppreſſionibus populo regis illatis:*" and, ſecondly, to receive and try preſentments certified from the court of attachments againſt offences in vert and veniſon. And this court may not only inquire, but convict alſo; which conviction ſhall be certified to the court of juſtice-ſeat under the ſeals of the jury, for this court cannot proceed to judgment. But the principal court is, 4. The court of juſtice-ſeat, which is held before the chief juſtice in eyre, or chief itinerant judge, *capitalis juſtitiarius in itinere*, or his deputy; to hear and determine all treſpaſſes within the foreſt, and all claims of franchiſes, liberties, and privileges, and all pleas and cauſes whatſoever therein ariſing. It may alſo proceed to try preſentments in the inferior courts of the foreſts, and to give judgment upon conviction of the ſweinmote. And the chief juſtice may therefore, after preſentment made or indictment found, but not before, iſſue his warrant to the officers of the foreſt to apprehend the offenders. It may be held every third year; and 40 days notice ought to be given of its ſitting. This court may fine and impriſon for offences within the foreſt, it being a court of record: and therefore a writ of error lies from hence to the court of king's bench, to rectify and redreſs any mal-adminiſtrations of juſtice; or the chief juſtice in eyre may adjourn any matter of law into the court of king's bench.

FOREST-*Towns*, in geography, certain towns of Suabia in Germany, lying along the Rhine, and the confines of Switzerland, and ſubject to the houſe of Auſtria. Their names are *Rhinefield, Seckingen, Lauſenburg*, and *Waldſhut*.

FORE-STAFF, or CROSS-*Staff*, an inſtrument uſed at ſea for taking the altitude of the ſun, moon, or ſtars. See STAFF.

FORESTALLER, a perſon who is guilty of foreſtalling. See the next article.

FORESTALLING, in law, buying or bargaining for any corn, cattle, victuals, or merchandiſe, in the way as they come to fairs or markets to be ſold, before they get thither, with an intent to ſell the ſame again at a higher price.

The puniſhment for this offence, upon conviction at the quarter-ſeſſions, by two or more witneſſes, is, for the firſt time, two months impriſonment and the loſs of the goods, or the value; for the ſecond offence, the offender ſhall be impriſoned ſix months, and loſe double the value of the goods; for the third offence, he ſhall ſuffer impriſonment during the king's pleaſure, forfeit all his goods and chattels, and ſtand on the pillory: but the ſtatute does not extend to maltſters buying barley, or to badgers licenſed.

FORESTER, a ſworn officer of the foreſt, appointed by the king's letters-patent, to walk the foreſt at all hours, and watch over the vert and veniſon; alſo to make attachments and true preſentments of all treſpaſſes committed within the foreſt.

If a man comes into a foreſt in the night, a foreſter cannot lawfully beat him before he makes ſome reſiſtance; but in caſe ſuch a perſon reſiſts the foreſter, he may juſtify a battery. And a foreſter ſhall not be queſtioned for killing a treſpaſſer that, after the peace cried to him, will not ſurrender himſelf, if it be not done on any former malice; though, where treſpaſſers in a foreſt, &c. do kill a perſon that oppoſes them, it is murder in all, becauſe they were engaged in an unlawful act, and therefore malice is implied to the perſon killed.

FORETHOUGHT-FELONY, in Scots law, ſignifies premeditated murder. See MURDER.

FORFAR, a town of Scotland, and capital of a county of the ſame name, ſituated in W. Long. 2. 32. N. Lat. 56. 25. of which Mr Pennant gives the following account. "It contains about 2000 ſouls; but ſince the great æra of the proſperity of North Britain, has increaſed above one half. The manufactures of linens in this neighbourhood, from fourpence to ſevenpence a-yard, are very conſiderable, and bring in, as is ſaid, near 20,000 l. a-year.—The caſtle ſtood on a ſmall hill near the town, but at preſent not a fragment is left.—The lake lies, or rather did lie, at a ſmall diſtance from the caſtle; and, according to tradition, once ſurrounded the town; there being in ſeveral parts, even to this day, marks of the deſerted channel. Of late years it has been very conſiderably reduced by draining; to which the vaſt quantity of fine marle at the bottom was the temptation. This fine manure is found there in ſtrata from three to ten feet thick, and very often is met with beneath the peat in the moors. The land improved with it yields four crops ſucceſſively; after which it is laid down with barley and clover." Forfar is a parliament-town, claſſed with Perth, Dundee, Coupar, and St Andrews, which all together ſend one member to parliament.

FORFAR-SHIRE, a county of Scotland of which Forfar is the capital. Including Angus, Glenila, Gleneſk, and Glenpraſſin, it extends 29 miles from eaſt to weſt, and 16 where broadeſt, though in ſome places the breadth does not exceed five miles. On the north it is divided from the Brae of Mar, by a ridge of the Binchinnen mountains; it is bounded on the ſouth by the Frith of Tay and the Britiſh ocean; on the eaſt by Mearns, and on the weſt by Perthſhire. Part of the Grampian mountains runs through this country, which is agreeably diverſified with hill and dale. It produces lead and iron in abundance, together with quarries of freeſtone and ſlate, with which the inhabitants drive a conſiderable traffic. The county is well watered with lakes, rivers, rivulets, and fountains, ſhaded with large foreſts, roughened with brown mountains, and waved with green hills interſperſed with fields and meadows, and adorned with fine ſeats and plantations. Their heaths and woods abound with hart, hind, roe-buck, and moor-game; their ſtreams are ſtocked with trout and ſalmon. Their hills are covered with flocks of ſheep, and their fields afford plentiful harveſts of wheat and all ſorts of grain. The mountains to the weſt and north are inhabited by Highlanders: but the Lowlanders poſſeſs the towns and champaign country, and are remarkable for their politeneſs and hoſpitality; though this laſt virtue often degenerates into downright debauchery, inſomuch, that the gentlemen value themſelves upon their proweſs in drinking. The common people are ſober, numerous, and addicted to traffic. Forfarſhire exhibits many monuments of antiquity. At the village of Miggle, in the neighbourhood of Coupar, there are ſeveral ſtones erected in the church-yard, embelliſhed with the figures of different animals and other ornaments. In the church-yard of Glamis, we ſee an old obeliſk or entire ſtone 16 feet high, ſet up over the grave of king Malcom II. who was murdered by the connivance of his own domeſtics. This ſtone is engraved with a number of figures alluding to the regicide; and at a little diſtance, within the park of Glamis, there is another ſtone marked with hieroglyphical ſymbols, which ſeem to expreſs the perpetration of the ſame murder. At the village of Coſſens, in the ſame neighbourhood, a very curious obeliſk appears lying in the fields. It is known by the name of *St Orland's ſtone*, and exhibits a great variety of figures in bas relief. There is another ſmall ſtone inſcribed with figures at Balutheren, in the neighbourhood of Dundee. At the diſtance of a mile to the ſouthward of Glamis, ſtands Denoon caſtle, upon an eminence, environed with ſteep rocks almoſt inacceſſible, having on the north two or three rows of terraces. It is built in a ſemicircular form, encompaſſed with a ſtupendous wall of ſtone and earth, 27 feet high, and 30 feet in thickneſs. It has two entries, one to the ſouth-eaſt and another to the north. The whole circumference of the wall amounts to 335 yards; and within this area, the ruins of ancient buildings are ſtill viſible. About four miles to the ſouthward of Brechin, at a place called *Aberlemny*, we find four or five ancient obeliſks, one of which is engraved with figures, ſuppoſed to be monuments of a great victory gained at the village of Loncarty, by the Scots over the Danes; a victory entirely owing to the valour of an huſbandman and his two ſons, of the ſurname of *Hay*, who were ennobled for their proweſs by king Kenneth III. From theſe deſcended the earls of Errol, hereditary high-conſtables of Scotland.

Smollet's preſent ſtate of all Nations, ii. 70.

FORFEITURE, originally ſignifies a tranſgreſſion, or offence againſt ſome penal law. The word is formed of the baſe Latin *foriſfactura*; whence *forſaitura* and *forſaictura*, and the French *forſait*. *Foriſfactura* comes of *foriſfacere*; which, according to Iſidore, ſignifies to "hurt or offend," *farcere contra rationem*; and which is not improbably derived of *foris* "out," and *facere*, "to do," q. d. an action out of rule, or contrary to the rules. Borel will have *forſait* derived from the uſing of force, or violence: Lobineau in his gloſſary will have *foriſfacta* properly to ſignify a mulct or amend, not a *forfeit*; which latter he derives from the baſe Britiſh *forſed*, "a penalty."

But, with us, it is now more frequently uſed for the effect of ſuch tranſgreſſion; or the loſing ſome right, privilege, eſtate, honour, office, or effects, in conſequence thereof; than for the tranſgreſſion itſelf.

Forfeiture differs from *confiſcation*, in that the former is more general; while confiſcation is particularly applied to ſuch things as become forfeited to the king's exchequer; and goods confiſcated are ſaid to be ſuch as nobody claims.

Forfeitures may be either in *civil* or *criminal* caſes.

I. With reſpect to the firſt, a man that hath an eſtate for life or years, may forfeit it many ways, as well as by treaſon or felony; ſuch as alienation, claiming a greater eſtate than he hath, or affirming the reverſion to be in a ſtranger, &c. When a tenant in tail makes leaſes, not warranted by the ſtatute; a copyholder commits waſte, refuſes to pay his rent, or do ſuit of court; and where an eſtate is granted upon condition, on non-performance thereof, &c. they will make a forfeiture.

Entry for a forfeiture ought to be by him who is next in reverſion, or remainder, after the eſtate forfeited. As if tenant for life or years commits a forfeiture, he who has the immediate reverſion or remainder ought to enter; though he has the fee, or only an eſtate-tail.

II. Forfeiture in criminal caſes is twofold; of real, and perſonal eſtates.

1. As to real eſtates, by ATTAINDER in high-treaſon, a man forfeits to the king all his lands and tenements of inheritance, whether fee-ſimple or fee-tail; and all his rights of entry on lands and tenements, which he had at the time of the offence committed, or at any time afterwards, to be for ever veſted in the crown; and alſo the profits of all lands and tenements, which he had in his own right for life or years, ſo long as ſuch intereſt ſhall ſubſiſt. This forfeiture relates backwards to the time of the treaſon committed; ſo as to avoid all intermediate ſales and incumbrances, but not thoſe before the fact: and therefore a wife's jointure is not forfeitable for the treaſon of her huſband; becauſe ſettled upon her previous to the treaſon committed. But her dower is forfeited, by the expreſs proviſion of ſtatute 5 & 6 Edw. VI. *c.* 11. And yet the huſband ſhall be tenant by the curteſy of the wife's lands, if the wife be attainted of treaſon: for that is not prohibited by the ſtatute. But, though after attainder the forfeiture relates back to the time of the treaſon committed, yet it does not take effect unleſs an attainder be had, of which it is one of the fruits; and therefore, if a traitor dies before judgment pronounced, or is killed in open rebellion, or is hanged by martial law, it works no forfeiture of his lands: for he never was attainted of treaſon. But if the chief juſtice of the king's bench (the ſupreme coroner of all England) in perſon, upon the view of the body of him killed in open rebellion, records it and returns the record into his own court, both lands and goods ſhall be forfeited.

Blackſt. Comment.

The natural juſtice of forfeiture or confiſcation of property, for treaſon, is founded on this conſideration:

That he who hath thus violated the fundamental principles of government, and broken his part of the original contract between king and people, hath abandoned his connexions with ſociety; and hath no longer any right to thoſe advantages, which before belonged to him purely as a member of the community; among which *ſocial* advantages the right of transferring or tranſmitting property to others is one of the chief. Such forfeitures, moreover, whereby his poſterity muſt ſuffer as well as himſelf, will help to reſtrain a man, not only by the ſenſe of his duty, and dread of perſonal puniſhment, but alſo by his paſſions and natural affections; and will intereſt every dependent and relation he has, to keep him from offending: according to that beautiful ſentiment of Cicero, "*nec vero me fugit quam ſit acerbum, parentum ſcelera filiorum pœnis lui: ſed hoc præclare legibus comparatum eſt, ut caritas liberorum amiciores parentes reipublicæ redderet.*" And therefore Aulus Caſcellius, a Roman lawyer in the time of the triumvirate, uſed to boaſt that he had two reaſons for deſpiſing the power of the tyrants; his old age, and his want of children: for children are pledges to the prince of the father's obedience. Yet many nations have thought, that this poſthumous puniſhment ſavours of hardſhip to the innocent; eſpecially for crimes that do not ſtrike at the very root and foundation of ſociety, as treaſon againſt the government expreſsly does. And therefore, although confiſcations were very frequent in the times of the earlier emperors, yet Arcadius and Honorius in every other inſtance but that of treaſon thought it more juſt, *ibi eſſe pœnam, ubi et noxa eſt;* and ordered that "*peccata ſuos teneant auctores, nec ulterius progrediatur metus, quam reperiatur delictum:*" and Juſtinian alſo made a law to reſtrain the puniſhment of relations; which directs the forfeiture to go, except in the caſe of *crimen majeſtatis*, to the next of kin to the delinquent. On the other hand, the Macedonian laws extended even the capital puniſhment of treaſon, not only to the children, but to all the relations of the delinquent: and of courſe their eſtates muſt be alſo forfeited, as no man was left to inherit them. And in Germany, by the famous golden bull, (copied almoſt *verbatim* from Juſtinian's code) the lives of the ſons of ſuch as conſpire to kill an elector are ſpared, as it is expreſſed, by the emperor's *particular bounty*. But they are deprived of all their effects and rights of ſucceſſion, and are rendered incapable of any honour eccleſiaſtical and civil: "to the end that, being always poor and neceſſitous, they may for ever be accompanied by the infamy of their father; may languiſh in continual indigence; and may find (ſays this mercileſs edict) their puniſhment in living, and their relief in dynig."

In England, forfeiture of lands and tenements to the crown for treaſon is by no means derived from the feodal policy, but was antecedent to the eſtabliſhment of that ſyſtem in this iſland; being tranſmitted from our Saxon anceſtors, and forming a part of the ancient Scandinavian conſtitution. But in certain treaſons relating to the coin, (which ſeem rather a ſpecies of the *crimen falſi* than the *crimen læſæ majeſtatis*) it is provided by ſome of the modern ſtatutes which conſtitute the offence, that it ſhall work no forfeiture of lands, ſave only for the life of the offenders; and by all, that it ſhall not deprive the wife of her dower. And, in order to aboliſh ſuch hereditary puniſhment entirely, it was enacted by ſtatute 7 Ann. c. 21. that, after the deceaſe of the late pretender, no attainder for treaſon ſhould extend to the diſinheriting of any heir, nor to the prejudice of any perſon, other than the traitor himſelf. By which, the law of forfeitures for high treaſon would by this time have been at an end, had not a ſubſequent ſtatute intervened to give them a longer duration. The hiſtory of this matter is ſomewhat ſingular, and worthy obſervation. At the time of the union, the crime of treaſon in Scotland was, by the Scots law, in many reſpects different from that of treaſon in England; and particularly in its conſequence of forfeitures of entailed eſtates, which was more peculiarly Engliſh: yet it ſeemed neceſſary, that a crime ſo nearly affecting government ſhould, both in its eſſence and conſequences, be put upon the ſame footing in both parts of the united kingdoms. In new-modelling theſe laws, the Scotch nation and the Engliſh houſe of commons ſtruggled hard, partly to maintain, and partly to acquire, a total immunity from forfeiture and corruption of blood: which the houſe of lords as firmly reſiſted. At length a compromiſe was agreed to, which is eſtabliſhed by this ſtatute, viz. that the ſame crimes, and no other, ſhould be treaſon in Scotland that are ſo in England; and that the Engliſh forfeitures and corruption of blood, ſhould take place in Scotland, till the death of the then pretender; and then ceaſe throughout the whole of Great Britain: the lords artfully propoſing this temporary clauſe, in hopes (it is ſaid), that the prudence of ſucceeding parliaments would make it perpetual. This has partly been done by the ſtatute 17 Geo. II. c. 39. (made in the year preceding the late rebellion), the operation of theſe indemnifying clauſes being thereby ſtill farther ſuſpended till the death of the ſons of the pretender.

In petit treaſon and felony, the offender alſo forfeits all his chattel intereſts abſolutely, and the profits of all freehold eſtates during life; and, after his death, all his lands and tenements in fee-ſimple (but not thoſe in tail) to the crown, for a very ſhort period of time: for the king ſhall have them for a year and a day, and may commit therein what waſte he pleaſes; which is called the king's *year, day,* and *waſte*. Formerly the king had only a liberty of committing waſte on the lands of felons, by pulling down their houſes, extirpating their gardens, ploughing their meadows, and cutting down their woods. And a puniſhment of a ſimilar ſpirit appears to have obtained in the oriental countries, from the decrees of Nebuchadnezzar and Cyrus in the books of Daniel and Ezra; which, beſides the pain of death inflicted on the delinquents there ſpecified, ordain, "that their houſes ſhall be made a dunghill." But this tending greatly to the prejudice of the public, it was agreed in the reign of Henry the firſt, in England, that the king ſhould have the profits of the land for one year and a day, in lieu of the deſtruction he was otherwiſe at liberty to commit: and therefore *magna charta* provides, that the king ſhall only hold ſuch lands for a year and a day, and then reſtore them to the lord of the fee; without any mention made of waſte. But the ſtatute 17 Edw. II. *de prærogativa regis*, ſeems to ſuppoſe, that the king ſhall have his year, day, *and* waſte; and not the year and day *inſtead of* waſte. Which Sir

Edward Coke (and the author of the Mirror, before, him) very juſtly look upon as an encroachment, tho a very ancient one, of the royal prerogative. This year, day, and waſte, are now uſually compounded for; but otherwiſe they regularly belong to the crown: and, after their expiration, the land would naturally have deſcended to the heir, (as in gavelkind tenure it ſtill does) did not its feodal quality intercept ſuch deſcent, and give it by way of eſcheat to the lord. Theſe forfeitures for felony do alſo ariſe only upon attainder; and therefore a *felo de ſe* forfeits no lands of inheritance or freehold, for he never is attainted as a felon. They likewiſe relate back to the time the offence was committed, as well as forfeitures for treaſon; ſo as to avoid all intermediate charges and conveyances. This may be hard upon ſuch as have unwarily engaged with the offender: but the cruelty and reproach muſt lie on the part, not of the law, but of the criminal; who has thus knowingly and diſhoneſtly involved others in his own calamities.

2. The forfeiture of goods and chattels accrues in every one of the high kinds of offence; in high treaſon, or miſpriſon thereof, petit treaſon, felonies of all ſorts whether clergyable or not, ſelf-murder or felony *de ſe*, petty larciny, ſtanding mute, &c. For flight alſo, on an accuſation of treaſon, felony, or even petit larciny, whether the party be found guilty or acquitted, if the jury find the flight, the party ſhall forfeit his goods and chattels: for the very flight is an offence, carrying with it a ſtrong preſumption of guilt, and is at leaſt an endeavour to elude and ſtifle the courſe of juſtice preſcribed by the law. But the jury very ſeldom find the flight: forfeiture being looked upon, ſince the vaſt increaſe of perſonal property of late years, as too large a penalty for an offence to which a man is prompted by the natural love of liberty.

There is a remarkable difference or two between the forfeiture of lands, and of goods and chattels. (1.) Lands are forfeited upon *attainder*, and not before: goods and chattels are forfeited by *conviction*. Becauſe in many of the caſes where goods are forfeited, there never is any attainder; which happens only where judgment of death or outlawry is given: therefore, in thoſe caſes, the forfeiture muſt be upon conviction, or not at all; and, being neceſſarily upon conviction in thoſe, it is ſo ordered in all other caſes, for the law loves uniformity. (2.) The forfeiture of lands has relation to the time the fact was committed, ſo as to avoid all ſubſequent ſales and incumbrances: but the forfeiture of goods and chattels has no relation backwards; ſo that thoſe only which a man has at the time of conviction ſhall be forfeited. Therefore a traitor or felon may *bona fide* ſell any of his chattels, real or perſonal, for the ſuſtenance of himſelf and family between the fact and conviction: for perſonal property is of ſo fluctuating a nature, that it paſſes through many hands in a ſhort time; and no buyer could be ſafe, if he were liable to return the goods which he had fairly bought, provided any of the prior vendors had committed a treaſon or felony. Yet if they be colluſively and not *bona fide* parted with, merely to defraud the crown, the law (and particularly the ſtatute 13 Eliz. c. 5.) will reach them; for they are all the while truly and ſubſtantially the goods of the offender: and as he, if acquitted, might recover them himſelf, as not parted with for a good conſideration; ſo, in caſe he happens to be convicted, the law will recover them for the king.

FORFICULA, the EAR-WIG, in zoology, a genus of inſects belonging to the order of coleoptera. The antennæ are briſtly; the elytra are dimidiated; the wings are covered; and the tail is forked. There are two ſpecies, viz. the auriculata, or common ear-wig, with the tops of the elytra white; and the minor, with teſtaceous and unſpotted elytra.—It is a very troubleſome creature, frequently introducing itſelf into the ears, and cauſing a great deal of pain by its biting: it likewiſe burrows in other parts of the body, which it bites in the ſame manner.

Ear-wigs are very miſchievous vermin in gardens, eſpecially where carnations are preſerved; for they are ſo fond of theſe flowers, that, if care is not taken to prevent them, they will entirely deſtroy them, by eating off the ſweet part at the bottom of the petals or leaves. To prevent which, moſt people have ſtands erected, which have a baſon of earth or lead round each ſupporter, which is conſtantly kept filled with water. Others hang the hollow claws of crabs and lobſters upon ſticks in divers parts of the garden, into which thoſe vermin get; and by often ſearching them, you will deſtroy them without much trouble, which will be of great ſervice to your wall-fruit, for theſe are great deſtroyers alſo of all ſoft fruits.

FORGE, properly ſignifies a little furnace, wherein ſmiths and other artificers of iron or ſteel, &c. heat their metals red hot, in order to ſoften them and render them more malleable and manageable on the anvil.

An ordinary forge is nothing but a pair of bellows, the nozzle of which is directed upon a ſmooth area, on which coals are placed. The nozzle of a pair of bellows may be alſo directed to the bottom of any furnace, to excite the combuſtion of the coals placed there, by which a kind of forge is formed. In laboratories, there is generally a ſmall furnace conſiſting of one cylindrical piece, open at top, which has at its lower ſide a hole for receiving the nozzle of a double bellows. This kind of forge-furnace is very convenient for fuſions, as the operation is quickly performed, and with few coals. In its lower part, two inches above the hole for receiving the nozzle of the bellows, may be placed an iron-plate of the ſame diameter, ſupported upon two horizontal bars, and pierced near its circumference with four holes diametrically oppoſite to each other. By this diſpoſition, the wind of the bellows, puſhed forcibly under this plate, enters at theſe four holes; and thus the heat of the fire is equally diſtributed, and the crucible in the furnace is equally ſurrounded by it. This contrivance is uſed in the forge-furnaces for melting copper, with this difference only, that theſe furnaces are ſquare, which is a matter of no conſequence.

As the wind of bellows ſtrongly and rapidly excites the action of the fire, a forge is very convenient when a great heat is to be applied quickly: but it is not ſuitable when the heat is to be gradually increaſed.

The forge, or blaſt of bellows, is uſed in ſeveral operations in ſmall; as to fuſe ſalts, metals, ores, &c. It is alſo much uſed in works in the great, which require ſtrong heat, without much management; and chiefly in the ſmelting of ores, and fuſion of metallic matters.

Forge is alſo uſed for a large furnace, wherein iron-ore, taken out of the mine, is melted down: or it is more properly applied to another kind of furnace, wherein the iron-ore, melted down and ſeparated in a former furnace, and then caſt into ſows and pigs, is heated and fuſed over again, and beaten afterwards with large hammers, and thus rendered more ſoft, pure, ductile, and fit for uſe.

Forge, in the train of artillery, is generally called a *travelling-forge*, and may not be improperly called a portable ſmith's-ſhop: at this forge all manner of ſmith's work is made, and it can be uſed upon a march as well as in camp. Formerly they were very ill contrived, with 2 wheels only, and wooden ſupporters to prop the forge for working when in the park. Of late years they are made with 4 wheels, which anſwers their purpoſe much better.

Forge *for red-hot Balls*, is a place where the balls are made red-hot before they are fired off: it is built about five or ſix feet below the ſurface of the ground, of ſtrong brick-work, and an iron grate, upon which the balls are laid, with a very large fire under them.

FORGER, in law, one guilty of forgery.

Forgery, (from the French *forger*, i. e. *accudare, fabricare*, "to beat on an anvil," "forge," or "form,") may be defined at common law, to be "the fraudulent making or alteration of a writing to the prejudice of another man's right:" for which the offender may ſuffer fine, impriſonment, and pillory. And alſo, by a variety of ſtatutes, a more ſevere puniſhment is inflicted on the offender in many particular caſes, which are ſo multiplied of late as almoſt to become general. We ſhall mention the principal inſtances.

By ſtatute 5 *Eliz. c.* 14. to forge or make, or knowingly to publiſh or give in evidence, any forged deed, court-roll, or will, with intent to affect the right of real property, either freehold or copyhold, is puniſhed by a forfeiture to the party grieved of double coſts and damages; by ſtanding in the pillory, and having both his ears cut off, and his noſtrils ſlit, and ſeared; by forfeiture to the crown of the profits of his lands, and by perpetual impriſonment. For any forgery relating to a term of years, or annuity, bond, obligation, acquittance, releaſe, or diſcharge of any debt or demand of any perſonal chattels, the ſame forfeiture is given to the party grieved; and on the offender is inflicted the pillory, loſs of one of his ears, and half a year's impriſonment: the ſecond offence, in both caſes, being felony without benefit of clergy.

Beſides this general act, a multitude of others, ſince the revolution, (when paper-credit was firſt eſtabliſhed) have inflicted capital puniſhment on the forging, altering, or uttering as true when forged, of any bank bills or notes, or other ſecurities; of bills of credit iſſued from the exchequer; of ſouth-ſea bonds, &c.; of lottery tickets or orders; of army or navy debentures; of Eaſt-India bonds; of writings under ſeal of the London or royal-exchange aſſurance; of the hand of the receiver of the pre-fines, or of the accountant-general and certain other officers of the court of chancery; of a letter of attorney or other power to receive or transfer ſtock or annuities; and on the perſonating a proprietor thereof, to receive or transfer ſuch annuities, ſtock, or dividends: alſo on the perſonating, or procuring to be perſonated, any ſeaman or other perſon, entitled to wages or other naval emoluments, or any of his perſonal repreſentatives; and the taking, or procuring to be taken, any falſe oath in order to obtain a probate, or letters of adminiſtration, in order to receive ſuch payments; and the forging, or procuring to be forged, and likewiſe the uttering or publiſhing, as true, of any counterfeited ſeaman's will or power: to which may be added, though not ſtrictly reducible to this head, the counterfeiting of mediterranean paſſes, under the hands of the lords of the admiralty, to protect one from the piratical ſtates of Barbary; the forging or imitating of any ſtamps to defraud the public revenue; and the forging of any marriage regiſter or licence: all which are, by diſtinct acts of parliament, made felonies without benefit of clergy. By ſtatutes 13 *Geo.* III. *c.* 52. & 59. forging or counterfeiting any ſtamp or mark to denote the ſtandard of gold and ſilver plate, and certain other offences of the like tendency, are puniſhed with tranſportation for 14 years. By ſtatute 12 *Geo.* III. *c.* 48. certain frauds on the ſtamp-duties, therein deſcribed, principally by uſing the ſame ſtamps more than once, are made ſingle felony, and liable to tranſportation for ſeven years. And the ſame puniſhment is inflicted by ſtatute 13 *Geo.* III. *c.* 38. on ſuch as counterfeit the common ſeal of the corporation for manufacturing plate-glaſs (thereby erected), or knowingly demand money of the company by virtue of any writing under ſuch counterfeit ſeal.

There are alſo two other general laws, with regard to forgery; the one 2 *Geo.* II. *c.* 25, whereby the firſt offence in forging or procuring to be forged, acting or aſſiſting therein, or uttering or publiſhing as true, any forged deed, will, bond, writing obligatory, bill of exchange, promiſſory note, indorſement or aſſignment thereof, or any acquittance or receipt for money or goods, with intention to defraud any perſon, (or corporation), is made felony without benefit of clergy. And by ſtatute 7 *Geo.* II. *c.* 22. it is equally penal to forge, or cauſe to be forged, or utter as true, a counterfeit acceptance of a bill of exchange, or the number of any accountable receipt for any note, bill, or any other ſecurity for money; or any warrant or order for the payment of money, or delivery of goods. So that, through the number of theſe general and ſpecial proviſions, there is now hardly a caſe poſſible to be conceived, wherein forgery, that tends to defraud, whether in the name of a real or fictitious perſon, is not made a capital crime.

Forging, in law, the act of Forgery.

Forging, in ſmithery, the beating or hammering iron on the anvil, after having firſt made it red-hot in the forge, in order to extend it into various forms, and faſhion it into works. See Forge.

There are two ways of forging and hammering iron. One is by the force of the hand, in which there are uſually ſeveral perſons employed, one of them turning the iron and hammering likewiſe, and the reſt only hammering. The other way is by the force of a water-mill, which raiſes and works ſeveral huge hammers beyond the force of man; under the ſtrokes whereof the workmen preſent large lumps or pieces of iron, which are ſuſtained at one end by the anvils, and at the other by iron-chains faſtened to the cieling of the forge. See Mill.

This laſt way of forging is only uſed in the largeſt works, as anchors for ſhips, &c. which uſually weigh ſeveral thouſand pounds. For the lighter works, a ſingle man ſerves to hold, heat, and turn with one hand, while he hammers with the other.

Each purpoſe the work is deſigned for, requires its proper heat; for if it be too cold, it will not feel the weight of the hammer, as the ſmiths call it when it will not batter under the hammer; and if it be too hot, it will red-ſear, that is, break or crack under the hammer.

The ſeveral degrees of heats the ſmiths give their irons, are, firſt, a blood-red heat; ſecondly, a white-flame-heat; and, thirdly, a ſparkling or welding heat.

FORGIVENESS, the act of pardoning any offender. See Morals, n° 146.

FORISFAMILIATION, in law. When a child, upon receiving a portion from his father, or otherwiſe, renounces his legal title to any further ſhare of his father's ſucceſſion, he is ſaid to be *foriſfamiliated*.

FORLI, an ancient and conſiderable town of Italy, and capital of a territory of the ſame name, in Romagna, with a biſhop's ſee. The public ſtructures are very handſome; and it is ſeated in a fertile, healthy, and pleaſant country, 10 miles ſouth-eaſt of Faenza, and 45 north-eaſt of Florence. E. Long. 12. 1. N. Lat. 44. 28.

FORLORN-hope, in the military art, ſignifies men detached from ſeveral regiments, or otherwiſe appointed, to make the firſt attack in day of battle; or, at a ſiege, to ſtorm the counterſcarp, mount the breach, or the like.—They are ſo called from the great danger they are unavoidably expoſed to; but the word is old, and begins to be obſolete.

FORM, in phyſics, the eſſential or diſtinguiſhing modification of the matter whereof a natural body is compoſed, ſo as thereby to give it ſuch a particular manner of exiſtence; being that which conſtitutes it ſuch a particular body, and diſtinguiſhes it from every other body.

Form is alſo uſed, in a moral ſenſe, for the manner of being or doing a thing according to rules: thus we ſay, a form of government, a form of argument, &c.

Form, in law, the rules eſtabliſhed and requiſite to be obſerved in legal proceedings.—The formal part of the law, or method of proceeding, cannot be altered but by parliament; for if once theſe outworks were demoliſhed, there would be an inlet to all manner of innovation in the body of the law itſelf.

Form, in carpentry, is uſed to denote the long ſeats or benches in the choirs of churches or in ſchools, for the prieſts, prebends, religious, or ſcholars, to ſit on. At ſchools, the word *form* is frequently applied to what is otherwiſe termed a *claſs*. See Class.

Form alſo denotes the external appearance or ſurface of a body, or the diſpoſition of its parts, as to the length, breadth, and thickneſs.

Form is alſo uſed, among mechanics, for a ſort of mould whereon any thing is faſhioned or wrought.

Printer's Form, an aſſemblage of letters, words, and lines, ranged in order, and ſo diſpoſed into pages by the compoſitor; from which, by means of ink and a preſs, the printed ſheets are drawn.

Every form is incloſed in an iron-chaſe, wherein it is firmly locked by a number of pieces of wood; ſome long and narrow, and others of the form of wedges. There are two forms required for every ſheet, one for each ſide; and each form conſiſts of more or fewer pages, according to the ſize of the book.

Hatters Form, is a large block or piece of wood, of a cylindrical figure; the top thereof rounded, and the bottom quite flat. Its uſe is, to mould or faſhion the crown of the hat, after the matter thereof has been beaten and fulled.

Papermakers Form, is the frame or mould wherein the ſheets are faſhioned. See Paper.

FORMA pauperis, in law, is when a perſon has juſt cauſe of ſuit, but is ſo poor, that he cannot defray the uſual charges of ſuing at law or in equity; in which caſe, on making oath that he is not worth 5l. in the world, on all his debts being paid, and producing a certificate from ſome lawyer that he has good cauſe of ſuit, the judge will admit him to ſue in *forma pauperis*; that is, without paying any fee to counſellors, attorneys, or clerk: the ſtatute 11 Hen. VII. *c.* 12. having enacted, that counſel and attorneys, &c. ſhall be aſſigned to ſuch poor perſons *gratis*. Where it appears that any pauper has ſold or contracted for the benefit of his ſuit, whilſt it is depending in court, ſuch cauſe ſhall be thenceforth totally diſmiſſed; and a perſon ſuing *in forma pauperis*, ſhall not have a new trial granted him, but is to acquieſce in the judgment of the court.

FORMAL, ſomething belonging to or conſtituting the form of a thing. See Form.

FORMATION, in philoſophy, an act whereby ſomething is formed or produced.—For the formation of the fœtus in the womb, ſee Generation.

Formation *of Stones*. See Stone.

Formation *of Metals and Minerals*. See Metal and Mineral.

Formation, in grammar, ſignifies the manner of forming one word from another: thus *accountantſhip* is formed from *accountant*, and this laſt from *account*.

FORMEDON, in law, (breve *de forma donationis*) a writ that lies for a perſon who has a right to lands or tenements, by virtue of any entail, ariſing from the ſtatute of Weſtm. 2 Ch. II.

This writ is of three kinds, viz. a deſcender, remainder, and reverter. Formedon in *deſcender*, lies where a tenant in tail infeoffs a ſtranger, or is diſſeiſed and dies, the heir may bring this writ to recover the lands. Formedon in *remainder*, lies where a man gives lands, &c. to a perſon in tail, and, for default of iſſue of his body, the remainder to another in tail: here if the tenant in tail die without iſſue, and a ſtranger abates and enters into the land, he in remainder ſhall have this writ. Formedon in *reverter*, lies where lands are entailed on certain perſons and their iſſue, with remainder over for want of iſſue; and, on that remainder failing, then to revert to the donor and his heirs: in this caſe, if the tenant in tail dies without iſſue, and alſo he in remainder, the donor and his heirs, to whom the reverſion returns, may have this writ for the recovery of the eſtate, though the ſame be alienated, &c.

FORMICA, or the Ant, in zoology, a genus of inſects belonging to the order of hymenoptera, the characters of which are theſe: There is a ſmall ſcale betwixt the breaſt and belly, and the joint is ſo deep, that the animal appears as if it were almoſt cut through the body. The females, and the neuters or working ants which have no ſexual characteriſtics, are furniſhed with a hidden ſting; and both the males and females have wings, but the neuters have none. There are 18 ſpecies, moſt of them diſtinguiſhed by their colours.

Theſe inſects keep together in companies like the bees, and maintain a ſort of republic. Their neſt is not exactly ſquare, but longer one way than the other; and in it there are a ſort of paths, which lead to different magazines. Some of the ants are employed in making the ground firm, by mixing it with a ſort of glue, for fear it ſhould crumble and fall down upon their heads. They may be ſometimes ſeen to gather ſeveral twigs, which ſerve them for rafters, which they place over the paths, to ſupport the covering; they lay others acroſs them, and upon them ruſhes, weeds, and dried graſs, which they heap up into a double declivity, which ſerves to turn off the water from their magazines. Some of theſe ſerve to lay up their proviſions in, and in others they lay their eggs.

As for the proviſions, they lay up every thing that is fit for them to eat; and you may often ſee one loaded with pippin or grain of fruit, another with a dead fly, and ſeveral together with the carcaſe of a may-bug or other inſect. If they meet with any they cannot bring away, they eat it upon the ſpot, or at leaſt ſo much of it as may reduce it to a bulk ſmall enough for them to carry. They do not run about where they pleaſe, at all adventures: for ſome of them are ſent abroad to make diſcoveries; and if they bring back news that they have met with a pear, or a ſugar-loaf, or a pot of ſweetmeats, they will run from the bottom of the garden, as high as the third ſtory of a houſe, to come at it. They all follow each other in the ſame path, without wandering to the right or the left; but in the fields they are more at their liberty, and are allowed to run about in ſearch of game. There is a ſort of green fly, that does a great deal of miſchief among the flowers, and which curls up the leaves of peach and pear trees: and theſe are ſurrounded with a ſort of glue, or honey, which the ants hunt after very greedily; for they touch neither the plant nor the flies themſelves.

Next to this, their greateſt paſſion is to lay up hoards of wheat, and other corn; and for fear the corn ſhould ſprout by the moiſture of the ſubterraneous cells, they gnaw off the end which would produce the blade. The ants are often ſeen puſhing along grains of wheat, or barley, much larger than themſelves.

In Africa, and particularly in Guinea, the ants are exceedingly troubleſome, and do a great deal of miſchief. They make their neſts of earth in the fields, twice as high as a man; beſides which they build large neſts in high trees, from which places they advance in ſuch prodigious ſwarms to the houſes, that they frequently oblige the inhabitants to quit their beds in the night-time. They will ſometimes attack a living ſheep; which in a night's time they will reduce to a perfect ſkeleton, leaving not the leaſt thing except the bones. It is common for them to ſerve domeſtic fowls in the ſame manner, and even the rats themſelves cannot eſcape them. If you place a worm or a beetle where only one or two ants are, they will immediately depart, and bring with them above an hundred; after which they ſeize their prey, and march off with it in good order. Theſe ants are of various ſorts; ſome great, others ſmall; ſome black, and others red: the ſting of this laſt is very painful, and cauſes an inflammation: the white are as tranſparent as cryſtal, and have ſuch ſtrong teeth, that in a night's time they will eat their way through a thick wooden cheſt, and make it as full of holes as if it had been penetrated by hail-ſhot.

There are alſo ſeveral ſorts of ants in the Eaſt Indies, whoſe numbers are prodigious: ſome of them are exceeding large, and of a ruddy colour, inclining to black; and ſome have wings, but others have none. They are very pernicious to the fruits of the earth, and do a great deal of miſchief in houſes, unleſs great care is taken to prevent them. It is remarkable, that if one ant meets another that is loaden, it always gives way to let it paſs freely.

The ant lays eggs in the manner of the common flies, and from theſe eggs are hatched a ſort of ſmall maggots or worms without legs: theſe are ſharp at one end, and blunt at the other; and are white, but ſo tranſparent, that the inteſtines are ſeen through the ſkin. Theſe, after a ſhort time, change into large white aureliæ, which are what are uſually called *ants eggs*. That end which is to be the tail is the largeſt, and that which is the head is ſomewhat tranſparent.

The ants move theſe about at pleaſure with their forceps. It is well known, that when a neſt of theſe creatures is diſturbed, and the aureliæ ſcattered about, the ants are at infinite pains to get together all that are unhurt, and make a neſt for them again: nay, any ants will do this, and thoſe of one neſt will often take care of the aureliæ of another.

The affection of the ant for its offspring is amazing. They carry the young worms about in their mouths, that nothing may injure them; and when the earth of the neſt is dry, they carry them down to a greater depth, but when wet they bring them to the ſurface, that they may not be injured by the damps.

The common ant builds only with ſmall pieces of dry earth, and there is always found a vaſt quantity either of eggs, worms, or aureliæ, at the bottom of the neſt. The aureliæ are covered only with a thin ſkin; and when carefully opened, they ſhew the worm perfect, and in its ſeveral ſtages of perfection.

The forecaſt of ants in providing againſt the winter is a miſtake. They are ſuppoſed not to eat in the winter, but to ſpend that ſeaſon, like dormice and many other ſorts of animals, in a ſtate of ſleep. What confirms this is, that they have been obſerved, as the cold draws on in the autumn, to move very heavily, and in the vintage-time they can hardly ſtir at all; ſo that the proviſion they make ſeems intended not for themſelves, but for their young.

The care theſe creatures take of their offspring is remarkable. Whenever a hill is diſturbed, all the ants are found buſied in conſulting the ſafety, not of themſelves, but of the eggs or theſe larger bodies incloſing the maggot or young ant; they carry theſe down any way ſo as to get them out of ſight, and will do this over and over as often as they are diſturbed.

They carry away the eggs and vermicles together in their confuſion; but, as ſoon as the danger is over, they carefully ſeparate them, and place each ſort in parcels by themſelves under ſhelter of different kinds, and at various depths, according to the different degrees of warmth and coverture the different ſtates require.

In the warm ſeaſon of the year, they every morning bring up the *eggs*, as they are uſually called, to the ſurface, or nearly ſo; and from ten in the forenoon to five in the afternoon or thereabouts, all theſe will be found juſt under the ſurface; and if the hills be examined toward eight in the evening, they will be found to have carried them all down; and if rainy weather be coming on, it will be neceſſary to dig a foot deep or more, in order to find them.

Theſe little creatures are very troubleſome in gardens, and in paſture-lands; as well by feeding on the fruit, as by making up hills for their habitation. In the hotter countries, as Italy, Spain, and the Weſt Indies, ants are the greateſt peſt of the fields. Trees may be preſerved from them by encompaſſing the ſtem, for four fingers breadth, with a roll of wool, newly pulled from the ſheep's belly; or by laying ſaw-duſt all round the ſtump of it. Some anoint the tree with tar, which has the ſame effect. See ANT.

The large, black, winged ants of America, to avoid the great rains which fall there at particular ſeaſons, make to themſelves large neſts on trees, with a covered way for them to go up and down on the lee-ſide of the tree. Theſe neſts are roundiſh on the outſide, made of light brown earth, plaſtered ſmooth. They are larger than a buſhel; and in the inſide are many ſinuous caverns or lodgings communicating with one another. See Plate CVIII. fig. 1. A, The ants neſt; B, The tubular paſſage, made of the ſame materials.

FORMICA-*Leo*, the *Ant-lion*, in zoology, an inſect ſo called from its devouring great numbers of ants. It is the caterpillar or worm of a fly much reſembling the libellæ or dragon-flies; and feeds chiefly upon ants, from which property it derives its name.

It is ſomewhat of the nature of the ſpider in its way of taking its prey, its manner of ſpinning, and the figure and ſoftneſs of its body. It has, in its general figure, ſomewhat of the appearance of the millepes or wood-louſe, ſo that ſome have miſtaken it at firſt ſight for that animal. It is of a dirty greyiſh colour, marked with ſome black ſpots; and theſe are alſo compoſed of many points when viewed with a microſcope, which make it reſemble a hedge-hog or porcupine. Its body is compoſed of ſeveral rings, and has thence a wrinkled look. It has ſix legs, four are joined to the breaſt, and the other two to a longer part, which may be taken for its neck. Its head is ſmall and flat, and it has two remarkable horns: theſe are about a ſixth part of an inch long, and as thick as a hair: they are hard, hollow, and hooked at the end like the claws of a cat. At the origin of each of theſe horns, it has a clear and bright black eye, which ſees very diſtinctly, and gives the creature notice to eſcape on ſight of the ſmalleſt object.—This creature is not able to hunt after its prey, nor to deſtroy large inſects; it can only draw into its ſnares ſuch as come near its habitation, and of theſe very few are ſuch as he can manage: all the winged kind are able to eſcape by flight; and the beetle kinds, and others that have hard ſhells upon their bodies, are of no uſe to him, as his horns cannot pierce them. The ſmallneſs of the ant, and its want of wings, make it the deſtined prey of this devourer. The manner in which he catches his prey is as follows.

He uſually encamps under an old wall, that he may be ſheltered from the injuries of the weather; and he always chooſes a place where the ſoil is compoſed of a fine dry ſand. In this he makes a pit of the ſhape of a funnel, or an inverted hollow cone. If he intends the pit to be but ſmall, he thruſts down his hinder part into the ſand, and by degrees plunges himſelf backward into it; and when he has got to a certain depth, he toſſes out the looſe ſand which has run down with his head, artfully throwing it off beyond the edges of his pit. Thus he lies at the bottom of a ſmall hollow, which is wideſt at the top, and comes ſloping down to his body.

But if he is to make a larger pit, more pains are required to bring it to perfection. He firſt traces, in the ſurface of the ſand, a large circle, which is the erected baſe or mouth of the pit he is to make in form of an inverted cone. He then buries himſelf in the ſand near the edge of this circle, and carefully throws up the ſand above him, with his head toſſing it out beyond the circumference of the circle. Thus he continues his work, running down backwards in a ſpiral line all the way, and carefully throwing off the ſand from above him, till he is come to the place of his reſt, which is the point or reverted apex of the hollow cone he has formed by his paſſage. The length of his neck, and the flatneſs of his head, gives him a power of uſing the whole as a ſpade, and throwing off the ſand with great eaſe; and his ſtrength in this part is ſo great, that he is able to throw off a quantity of it to ſix inches diſtance. This is a power he exerts oftener, however, in throwing away the remains of the animals he has fed upon, that his den may not become frightful to others of the ſame ſpecies, by ſeeing their fellow carcaſes about it.

When he has finiſhed his pit, he buries himſelf at the bottom of it among the ſand, leaving no part above ground but the tips of his two horns, which he expands to the two ſides of the pit. In this condition he lies and waits for his prey, and never comes up afterwards. When an ant, or any other ſuch creature, chances to walk over the edges of his pit, its ſteps throw down a a little of the ſand, which naturally running down to the bottom of the pit, gives the enemy notice of his prey; he then toſſes up the ſand which covers his head, to bury the ant, and bring him down with its returning force to the bottom; and as one ſuch attempt cannot be ſufficient to prevent the ant's eſcape, he throws more and more ſand upon him, till he by degrees brings him down. All the endeavours of the ant to eſcape, when once it is within the verge of the pit, are in vain; for, as it attempts to climb, the ſand runs away from under its feet, and it ſinks the lower for every attempt. This motion of the ſand alſo informs the enemy where it is, and directs him to throw up more ſand in the right place; which it does, till the poor ant falls to the bottom between its horns. It then plunges their points deep into the ant's body; and having ſucked out all the juice out of the prey, it throws out the empty ſkin as far from the hole as it can. This done, it mounts up the edges of its pit, and if it has ſuffered any injury, repairs it with great care, and immediately buries itſelf again in the centre, to wait for another meal. The horns of this creature are its only organs for receiving nouriſhment; it never brings any animal which it has ſeized near to its head, but always holds it at the tip of the horns. They therefore plainly ſerve as ſyringes, to draw into its ſtomach the juices of the bodies of the inſects it feeds upon: neither is there any mouth or trunk, or any other organ to be diſcovered about its head, which could ſerve to the purpoſe of eating; the head ſeeming only intended for throwing away the ſand in forming the pit. The horns of this animal being ſo neceſſary to its life, nature has provided for the reſtoring them in caſe of accidents; and, if cut off, they are found to grow again.

The food this creature procures by its pit can be but little; and as it has no power of catching its prey any other way, its motion being only backwards, and that ſlowly, and by ſmall ſpaces at a time, ſome people have believed its catching now and then an ant by this means was rather for diverſion than hunger. But tho' the formica leo will live a long time without food, and even paſs through all its changes when ſhut up in a box, yet it is always ready to eat when food is offered it; it always appears ſtarved and ſmall when kept thus; and if a fly is given it in this hungry ſtate, it will ſo ſuck out all its juices, that the ſhell remaining may be rubbed to powder between the fingers, while the body of the creature that has ſucked it appears remarkably ſwelled and diſtended; ſo that it is plain that the juices of the prey are conveyed into the body of the creature; though it is not eaſy to ſee by what means, the horns not appearing to have any perforation.

When the formica leo has lived a proper time in this ſtate, it leaves its pit, and is only ſeen drawing lines and traces on the ſurface of the ſand. After this it buries itſelf under the ſurface; and there incloſes itſelf in a fine web, in which it is to paſs its tranſformation into the winged ſtate. This caſe is made of a ſort of ſilk which the creature ſpins in the manner of the ſpider, and of a quantity of the grains of ſand cemented together by a glutinous humour which flows from its pores. This caſe, however, would be too harſh and coarſe for the body of the creature, and therefore it ſerves only for the outer covering to defend it from injuries; the creature ſpinning one of pure and incomparably fine ſilk, of a beautiful pearl colour, within it, which covers its whole body.

When the creature has lain ſome time in this caſe, it throws off its outer ſkin, with the eyes, the horns, and every other part neceſſary to its life before, and becomes an oblong nymph, in which a careful eye may trace the form of the fly into which it is to be tranſformed. There may be ſeen, through its tranſparent covering, new eyes, new horns, wings, and all the other parts of the animal in its perfect ſtate. This nymph makes its way about half out of the ſhell, and remains in this condition, but without farther life or motion, till the perfect fly makes its way out at a ſlit in the back. In this laſt ſtate it much reſembles the libellæ or dragon-flies common about our waters. The male couples with the female in this ſtate only; and M. Poupart, to whom the world is obliged for this curious deſcription, is of opinion that the females lay only one egg; but this is very different from the courſe of nature in the other animals of the ſame claſs.

When this inſect forms its pit in a bed of pure ſand, it is made and repaired with great eaſe; but where it meets with other ſubſtances among the ſand, the labour becomes greatly the more embarraſſing. If, for inſtance, when the creature has half-formed its pit, and then comes to a ſtone of ſome moderate ſize, it does not deſert the work for this, but goes on, intending to remove that impediment at laſt. When the pit is finiſhed, the creature crawls backward up the ſide of the place where the ſtone is, and getting its backſide under it, takes great pains and time to get it on a true poiſe, and then begins to crawl backward with it up the edge to the top of the pit, to get it out of the way. It is a very common thing to ſee a formica-leo in this manner labouring at a ſtone four times as big as its own body; and, as it can only move backward, and the poiſe is hard to keep, eſpecially up a ſlope of ſuch crumbly matter as ſand, which moulders away from under its feet, and neceſſarily alters the poſition of its body, the ſtone very frequently falls down when near the verge, and then it is ſure to roll to the bottom. In this caſe the animal attacks it again in the ſame way, and often is not diſcouraged by five or ſix miſcarriages of this kind, but, after all, attempts again, and at length gets over the verge of the place. When it has done this, it does not leave it there, leſt it ſhould roll in again; but is always at the pains of puſhing it farther on, till it has removed it to a neceſſary diſtance from the edge of the pit.

The common formica-leo moves only backward; but Mr Rouet has obſerved a ſpecies which moves forward in the common way of other animals, and makes no pit of this kind to entrap its prey, but ſeizes other inſects by force.

FORMOSA, an iſland in the Pacific ocean, between 119° and 122° of E. Long. and between 22° and 25° N. Lat. about 100 miles eaſt of Canton in China. It is ſubject to the Chineſe.

FORMULA, or Formulary, a rule or model, or certain terms preſcribed or decreed by authority, for the form and manner of an act, inſtrument, proceeding, or the like.

Formula, in church-hiſtory and theology, ſignifies a profeſſion of faith.

Formula, in medicine, imports the conſtitution of medicines, either ſimple or compound, both with reſpect to their preſcription and conſiſtence.

FORMULARY, a writing containing the form of an oath, declaration, atteſtation, abjuration, &c. to be made on certain occaſions.

FORNACALIA, or Fornicalia, in Roman antiquity, a feſtival inſtituted by Numa in honour of Fornax, the goddeſs of ovens; wherein certain cakes were made, and offered in ſacrifice before the ovens.

FORNICATION, (*Fornicatio*, from the *fornices* in Rome, where the lewd women proſtituted themſelves for money), is whoredom, or the act of incontinency, between ſingle perſons; for if either of the parties is married, it is *adultery*. Formerly court-leets had power to inquire of and puniſh fornication and adultery; in which courts the king had a fine aſſeſſed on the offenders, as appears by the book of Domeſday.

In the year 1650, when the ruling powers found it for their intereſt to put on the ſemblance of a very extraordinary ſtrictneſs and purity of morals, not only inceſt and wilful adultery were made capital crimes, but alſo the repeated act of keeping a brothel, or committing fornication, were (upon a ſecond conviction) made felony without benefit of clergy. But, at the reſtoration, when men, from an abhorrence of the hypocriſy of the late times, fell into a contrary extreme of licentiouſneſs, it was not thought proper to renew a law of ſuch unfaſhionable rigour. And theſe offences have been ever ſince left to the feeble coercion of the ſpiritual court, according to the rules of the canon law; a law which has treated the offence of incontinence, nay, even adultery itſelf, with a great degree of tenderneſs and lenity; owing perhaps to the conſtrained celibacy of its firſt compilers. The temporal courts therefore take no cogniſance even of the crime of adultery otherwiſe than as a private injury. See ADULTERY.

FORNIX, in anatomy, is part of the corpus calloſum in the brain; ſo called, becauſe of a diſtant reſemblance it hath to the arches of ancient vaults when viewed in a particular manner.

FORRAGE, in the military art, denotes hay, oats, barley, wheat, graſs, clover, &c. brought into the camp by the troopers, for the ſuſtenance of their horſes.

It is the buſineſs of the quarter-maſter general to appoint the method of forrage, and poſt proper guards for the ſecurity of the foragers.

FORRES, a parliament-town of Scotland in the county of Murray. W. Long. 3. 20. N. Lat. 57. 40. It is claſſed with Inverneſs, Fortroſe, and Nairn.

FORT, in the military art, a ſmall fortified place, environed on all ſides with a moat, rampart, and parapet. Its uſe is to ſecure ſome high ground or the paſſage of a river, to make good an advantageous poſt, to defend the lines and quarters of a ſiege, &c.

Forts are made of different figures and extents, according as the ground requires. Some are fortified with baſtions, others with demi-baſtions. Some again are in form of a ſquare, others of a pentagon. A fort differs from a citadel, as this laſt is built to command ſome town.

FORTALICE, in Scots law, ſignified anciently a ſmall place of ſtrength, originally built for the defence of the country; and which on that account was formerly reckoned *inter regalia*, and did not go along with the lands upon which it was ſituated without a ſpecial grant from the crown. Now, fortalices are carried by a general grant of the lands; and the word is become ſynonymous with manor-place, meſſuage, &c.

FORTESCUE (Sir John), lord chief juſtice of the king's bench, and lord high chancellor of England, in the reign of king Henry VI. was deſcended from the ancient family of Forteſcue, in the county of Devon. He ſtudied the municipal laws of England in Lincoln's Inn, of which he was made one of the governors in the fourth and ſeventh years of the reign of king Henry VI. In 1430 he was called to the degree of a ſerjeant at law, and in 1441 was conſtituted the king's ſerjeant. The following year he was made lord chief juſtice of the king's bench; in which honourable ſtation he continued till near the end of that king's reign, who ſhewed him many particular marks of his favour, and advanced him to the poſt of lord high chancellor of England. During the reign of king Edward IV. he followed the fortunes of the houſe of Lancaſter, and was many years in exile with queen Margaret and prince Edward her ſon. At length, they having a proſpect of retrieving their deſperate fortunes, the queen and prince returned to England, and Sir John Forteſcue, with many others, accompanied them: but ſoon after the deciſive battle of Tewkſbury, he was thrown into priſon and attainted, with other Lancaſtrians; but found means to procure his pardon from Edward IV. He wrote, 1. A learned commentary on the politic laws of England, for the uſe of prince Edward; to one edition of which Mr Selden wrote notes. 2. The difference between an abſolute and limited monarchy, as it more particularly regards the Engliſh conſtitution: (which was publiſhed, with ſome remarks, by John Forteſcue, afterwards Lord Forteſcue, in 8vo, in 1714; and a ſecond edition was publiſhed, with amendments, in 1719:) And ſeveral works, which ſtill remain in manuſcript. He died near 90 years of age; and was buried in the pariſh-church of Ebburton, where a monument was erected to his memory, in 1677, by one of his deſcendants.

FORTH, one of the moſt noble and commodious rivers in Scotland. It takes its riſe near the bottom of Leimon hills; and running from weſt to eaſt, receives in its paſſage many conſiderable ſtreams, deriving their waters from the eminences in the midland counties of North Britain. Between Stirling and Alloa, the Forth winds in a moſt beautiful and ſurpriſing manner; ſo that, though it is but four miles by land, it is 24 by water between theſe two places. Below Alloa the river expands itſelf to a great breadth between the counties of Lothian and Fife, till at Queen's-ferry it is contracted by promontories ſhooting into it from both coaſts; ſo that, from being four or five, there it is not above two miles broad. In the middle of the channel lies a ſmall iſland called *Inchgary*, which has a ſpring of freſh water: and upon it there was anciently a fort; and if that was thoroughly repaired, or a new one erected, and there were either forts or blockhouſes on the oppoſite promontories, that part of the river which lies between Alloa and Queens-ferry would be as ſecure and convenient a harbour as could be deſired. Below Queen's-ferry the north and ſouth ſhores receding, the body of the water gradually enlarges till it becomes two or three leagues broad, affording ſeveral ſafe harbours on both ſides, and excellent roads throughout, unembarreſſed with latent rocks, ſhoals, or ſands; and allowing ſecure anchorage to the largeſt ſhips within a league of the coaſt, in almoſt any part of the Frith; and to veſſels of a ſmaller ſize within a mile or leſs. The Firth, or (as it is commonly written) the *Frith*, of Forth, is, at the mouth of it, from North Berwick to Fifeneſs, full five leagues broad; having the little iſland of May (on which there is a light-houſe, and there might alſo be a fort) in the middle of it, and to the weſt of this the rocky iſland of Baſs; notwithſtanding which, the largeſt fleet may enter and ſail up it many miles with the utmoſt facility and in the greateſt ſafety. From its mouth to Stirling-bridge it is 20 leagues in extent. It was known to the ancients by the name of *Bodotria*, or (as Ptolemy calls it) *Boderia*, and has been ever famous for the number of its havens; ſome of which are, indeed, in their preſent condition, ſcarce worthy of that name; but, however, moſt of them are capable of being put in a much better ſtate, whenever the commerce of this country ſhall require it.

FORTIFICATION;

THE art of fortifying a town, or other place; or of putting them in ſuch a poſture of defence, that every one of its parts defends, and is defended by, ſome other parts, by means of ramparts, parapets, moats, and other bulwarks; to the end that a ſmall number of men within may be able to defend themſelves for a conſiderable time againſt the aſſaults of a numerous army without, ſo that the enemy in attacking them muſt of neceſſity ſuffer great loſs.

The origin and riſe of fortification, is undoubtedly owing to the degeneracy of mankind. In the firſt ages of the world, men were diſperſed up and down the countries in ſeparate families, as we are told in the hiſtories of the Jews and Scythians, who wandered from one place to another, for the ſake of finding paſture for their cattle. Theſe families became in time ſo numerous as to form large communities, which ſettled all together in a place; from whence villages and towns had their origin and riſe: but they found it was neceſſary, for the common ſecurity, to ſurround thoſe towns with walls and ditches, to prevent all violences *from their neighbours, and ſudden ſurpriſes*. This was ſufficient for ſome time, till offenſive weapons were invented, and conquering became a faſhion. Then walls with loop-holes were made at proper diſtances, in order to ſcreen the defenders againſt the arrows of the aſſailants: but finding that, as ſoon as the enemy got once cloſe to the walls, they could from no part be diſcovered or repulſed; for this reaſon they added ſquare towers at proper diſtances from each other, ſo that every part of the wall might be defended by the adjacent ſides of the towers. However, this manner of incloſing of towns was found to be imperfect, becauſe there remained ſtill one of the faces of the towers which fronted the field that could not be ſeen from any other part, and therefore could not be defended. To remedy this, they made the towers round inſtead of ſquare, imagining this figure to be the ſtrongeſt to reſiſt the battering engines, as likewiſe to be better defended from the other parts of the wall.

Notwithſtanding the ſuperiority of this method above the former, there remained yet a part of theſe towers unſeen and incapable of being defended; which made them change the figure of the towers again; that is, they made them ſquare as before; but, inſtead of preſenting a face to the field as formerly, they preſented an angle; by this means they effectually found out ſuch a diſpoſition of their works, that no part could be attacked without being ſeen or defended by ſome other part.

This laſt method was in uſe a long while; and would in all probability have continued to this day, if gunpowder had not been found out: but the violence of the guns and mortars ſoon convinced the world, that ſuch towers and walls were but a weak defence againſt theſe thundering engines; and beſides, as the nature of the attack was entirely changed, it was alſo neceſſary to change that of fortifying likewiſe.

From that time, ramparts were added to the walls, the towers enlarged into baſtions, and all ſorts of outworks have been added, ſuch as ravelins, counterguards, horn and crown works, and others of the like nature, in order to render the defence in ſome meaſure equivalent to the attack.

Notwithſtanding all the improvements which have been made in the art of fortifying ſince the invention of gun-powder, that of attacking is ſtill ſuperior to it: engineers have tried in vain to render the advantages of a fortification equal to thoſe of the attack; the ſuperiority of the beſiegers fire, together with the greater number of men, obliges generally, ſooner or latter, the beſieged to ſubmit.

The greateſt improvement made in the art of attacking happened in the year 1697, when M. Vauban made firſt uſe of ricochet-firing at the ſiege of Ath, whereby the beſieged placed behind the parapets were as much expoſed to the fire of the beſiegers as if there had been none; whereas, before, they had been ſecure as long as the parapet was not demoliſhed: and the worſt is, that there can be no remedy found to prevent this enfilading, without falling into inconveniencies almoſt as bad as thoſe which we endeavour to avoid.

FORTIFICATION is either regular or irregular. *Regular* fortification, is that built in a regular polygon, the ſides and angles of which are all equal, being commonly about a muſket-ſhot from each other. *Irregular* fortification, on the contrary, is that where the ſides and angles are not uniform, equidiſtant, or equal; which is owing to the irregularity of the ground, valleys, rivers, hills, and the like.

SECTION I. *Of Regular Fortification.*

ALTHOUGH authors agree as to the general form in the preſent manner of fortifying, yet they moſtly differ in particular conſtructions of the parts. As it would be both needleſs and ſuperfluous to treat of all the different methods hitherto propoſed, we ſhall content ourſelves with explaining thoſe only, which are moſt eſteemed by the beſt judges, and have been moſtly put in practice.

Conſtruction of M. VAUBAN'*s Method.*

THIS method is divided into little, mean, and great; the *little* is chiefly uſed in the conſtruction of citadels, the *mean* in that of all ſorts of towns, and the *great* in particular caſes only.

We ſhall give the conſtruction of the mean, as being moſt uſeful; and refer the reader to the table hereafter, for thoſe dimenſions which are different in theſe ſeveral fortifications.

Inſcribe in a circle a polygon of as many ſides as the Plate CXII. fortification is deſigned to have fronts; let AB be one fig. 1. of the ſides of half an hexagon, which biſect by the perpendicular CD; divide half AC of it into nine equal parts, and one of theſe into ten others; then theſe diviſions will ſerve as a ſcale to conſtruct all the parts of the fortification, and each of them is ſuppoſed to be a toiſe or fathom, that is, ſix French feet; and therefore the whole ſide AB is ſuppoſed to be 180 toiſes.

As the dividing a line into ſo many equal parts, is troubleſome and tedious; it is more convenient to have a ſcale of equal parts by which the works may be conſtructed.

If therefore, in this caſe, the radius is taken equal to 180 toiſes, and the circle deſcribed with that radius being divided into ſix equal parts, or the radius being carried ſix times round, you will have an hexagon inſcribed; AB being biſected by the perpendicular CD as before, ſet off 30 toiſes from C to D, and draw the indefinite lines ADG, BDF; in which take the parts AE, BH, each equal to 50 toiſes; from the centre E deſcribe an arc through the point H, meeting AD in G, and from the centre H deſcribe an arc through the point E, meeting BD in F; or which is the ſame, make each of the lines EG, HF, equal to the diſtance EH; then the lines joining the points A, E, F, G, H, B, will be the principal or outline of the front.

If the ſame conſtruction be performed on the other ſides of the polygon, you will have the principal or outline of the whole fortification.

If, with a radius of 20 toiſes, there be deſcribed circular arcs, from the angular points B, A, M, T, and lines are drawn from the oppoſite angles E, H, &c. ſo as to touch theſe arcs their parts a b, b c, &c. together with theſe arcs, will repreſent the outline of the ditch.

DEFINITIONS.

1. The part FEALN, is called the baſtion.
2. AE, AL, the faces of the baſtion.
3. EF, LN, the flanks.
4. FG, the curtain.
5. FN, the gorge of the baſtion.
6. AG, BF, the lines of defence.
7. AB, the exterior ſide of the polygon.
8. CD, the perpendicular.
9. Any line which divides a work into two equal parts, is called the capital of that work.
10. a b c, the counterſcarp of the ditch.
11. A, M, the flanked angles.
12. H, E, L, the angles of the ſhoulder, or ſhoulder only.
13. G, F, N, the angles of the flank.
14. Any angle whoſe point turns from the place is called a *ſaliant angle*, such as A, M: and any angle whoſe point turns towards the place, *re-entering angle*, ſuch as b, F, N.
15. If there be drawn two lines parallel to the principal or outline, the one at 3 toiſes diſtance, and the other at 8 from it; then the ſpace y x included between the principal one and that fartheſt diſtant, is called the *rampart*.

And the ſpace x x, contained by the principal line, and that near to it, and which is generally ſtained black, is called the *parapet*.

16. There is a fine line drawn within four feet of the parapet, which expreſſes a ſtep called *banquette*.

N. B. All works have a parapet of three toiſes thick, and a rampart of 8 to 10, beſides their ſlopes. The rampart is elevated more or leſs above the level of the place, from 10 to 20 feet, according to the nature of the ground and the particular conſtructions of engineers.

The parapet is a part of the rampart elevated from 6 to 7½ feet above the reſt, in order to cover the troops which are drawn up there from the fire of the enemy in a ſiege; and the banquette is two or three feet higher than the rampart, or about four feet lower than the parapet; ſo that when the troops ſtand upon it, they may juſt be able to fire over the parapet.

17. The body of the place, is all that which is contained within this firſt rampart: for which reaſon, it is often ſaid to conſtruct the body of the place; which means properly, the conſtruction of the baſtions and curtains.

18. All the works which are conſtructed beyond the ditch before the body of the place are called *outworks*.

TABLE.

	Forts.						Little Fortif.				Mean		Great.	
Side of Polyg.	80	90	100	110	120	130	140	150	160	170	180	190	200	260
Perpendicul.	10	11	12½	14	15	16	20	21	23	25	30	31	25	22
Faces baſt.	22	25	28	30	33	35	40	42	45	47	50	53	55	60
Cap. of ravel.	25	28	30	35	38	40	45	50	50	52	55	55	60	50

In the firſt vertical column are the numbers expreſſing the lengths of the exterior ſides from 80 to 260. In the ſecond, the perpendiculars anſwering to theſe ſides. In the third, the lengths of the faces of baſtions; and in the fourth, the lengths of the capitals of the ravelins.

The forts are moſtly, if not always, ſquares: for which reaſon, the perpendiculars are made one eighth of the exterior ſides; becauſe if they were more, the gorges of the baſtions would become too narrow.

The little fortification is chiefly deſigned for citadels, and are commonly pentagons; the perpendiculars are made one ſeventh of the exterior ſide: the mean is uſed in all kinds of fortifications from an hexagon upwards to any number of ſides: and the great is ſeldom uſed but in an irregular fortification, where there are ſome ſides that cannot be made leſs without much expence; or in a town which lies near a great river, where the ſide next the river is made from 200 to 260 toiſes; and as that ſide is leſs expoſed to be attacked than any other, the perpendicular is made ſhorter, which ſaves much expenee.

The faces of the baſtions are all $\frac{2}{7}$ths of the exterior ſides, or nearly ſo, becauſe the fractions are neglected.

It may be obſerved in general, that in all ſquares the perpendicular is $\frac{1}{8}$th of the exterior ſide, and all pentagons $\frac{1}{7}$th, and in all the reſt upward $\frac{1}{6}$th.

Plate CXI.

1. *Conſtruction of Orillons and retired Flanks.*

Describe the front MPQRST as before, and divide the flank into three equal parts, of which ſuppoſe S r to be one: from the oppoſite flanked angle M draw a line M r, in which take the part m r of 5 toiſes; take likewiſe R n in the line of defence M R, produced, equal to 5 toiſes, and join n m, upon which as a baſe deſcribe the equilateral triangle n p m, and from the angle p, oppoſite to the baſe as centre, is deſcribed the circular flank n m.

And if S r be biſected by the perpendicular 1, 2, and another be erected upon the face ST, at S; the interſection 2 of theſe two perpendiculars, will be the centre of the arc which forms the orillon.

The orillons are very uſeful in covering the retired flanks, which cannot be ſeen but directly in the front; and as theſe orillons are round, they cannot be ſo eaſily deſtroyed as they would be if they were of any other figure.

2. *Conſtruction of Ravelins or Half-moons.*

Fig. 2. Set off 55 toiſes, from the re-entering angle O of the counterſcarp, on the capital O L or on the perpendicular produced, and from the point L draw lines to the ſhoulders AB; whoſe parts LM, LN, terminated by the counterſcarp, will be the faces, and MO, ON, the ſemi-gorges of the ravelin required.

This is Mr Vauban's method of conſtructing ravelins, according to ſome authors: and others will have the faces of the ravelin to terminate on thoſe of the baſtions within 3 toiſes of the ſhoulders; which ſeems to be the beſt way, for theſe ravelins cover the flanks much better than the others.

The ditch before the ravelin is 12 toiſes, its counterſcarp parallel to the faces of the ravelins; and is made in a circular arc, before the ſaliant angle; as likewiſe all ditches are in general.

When the ravelins are made with flanks, as in fig. 3. the faces ſhould terminate on thoſe of the baſtions, at leaſt 5 toiſes from the ſhoulders.

The flanks are made by ſetting off 10 toiſes from the extremities of the faces, from f to h, and from m to l; and from the points h, l, the flanks h k, l p, are drawn parallel to the capital L O of the ravelin.

There are ſometimes redoubts made in the ravelin, ſuch as in fig. 2. which is done by ſetting off 16 toiſes from the extremities of the faces on the ſemi-gorges from N to b, and from M to a; and from the points b, a, the faces are drawn parallel to thoſe of the ravelin: the ditch before the redoubt is 6 toiſes, and its counterſcarp parallel to the faces.

3. *Conſtruction of Tenailles.*

A tenaille is a work made in the ditch before the curtains, the parapet of which is only 2 or 3 feet higher than the level ground of the ravelin. There are three different ſorts: the firſt are thoſe as in fig. 4. which are made in the direction of the lines of defence, leaving a paſſage of 3 toiſes between their extremities and the flanks of the baſtions, as likewiſe another of 2 in the middle for a bridge of communication to the ravelin.

The ſecond ſort are thoſe as in fig. 5. Their faces are in the lines of defence, and 16 toiſes long, beſides the paſſage of 3 toiſes between them and the flanks of the baſtions; their flanks are found by deſcribing arcs from one ſhoulder of the tenaille as centre through the other, on which are ſet off 10 toiſes for the flanks deſired.

Plate CXI.

And the third ſort are thoſe as in fig. 6. Their faces are 16 toiſes, as in the ſecond ſort, and the flanks are parallel to thoſe of the baſtions.

The uſe in general of tenailles, is to defend the bottom of the ditch by a grazing fire, as likewiſe the level ground of the ravelin, and eſpecially the ditch before the redoubt within the ravelin, which can be defended from no where elſe ſo well as from them.

The firſt ſort do not defend the ditch ſo well as the others, as being too oblique a defence; but as they are not ſubject to be enfiladed, M. Vauban has generally preferred them in the fortifying of places, as may be ſeen in the citadel of Lille, at Laudau, New Briſac, and in a great many other places.

The ſecond ſort defend the ditch much better than the firſt, and add a low flank to thoſe of the baſtions; but as theſe flanks are liable to be enfiladed, they have not been much put in practice. This defect might however be remedied, by making them ſo as to be covered by the extremities of the parapets of the oppoſite ravelins, or by ſome other work.

As to the third ſort, they have the ſame advantage as the ſecond, and are likewiſe liable to the ſame objections; for which reaſon, they may be uſed with the ſame precautions which have been mentioned in the ſecond.

Tenailles are eſteemed ſo neceſſary, that there is hardly any place fortified without them: and it is not without reaſon. For when the ditch is dry, the part behind the tenailles ſerves as a place of arms, from which the troops may ſally, deſtroy the works of the enemy in the ditch, oppoſe their deſcent, and retire with ſafety; and the communication from the body of the place to the ravelin becomes eaſy and ſecure: which is a great advantage; for by that means the ravelin may make a much better defence, as it can be ſupplied with troops and neceſſaries at any time. And if the ditch is wet, they ſerve as harbours for boats, which may carry out armed men to oppoſe the paſſage over the ditch whenever they pleaſe; and the communication from the tenailles to the ravelin, becomes likewiſe much eaſier than it would be without them.

4. *Conſtruction of Lunettes.*

Fig. 7. Lunettes are placed on both ſides of the ravelin, ſuch as B, to increaſe the ſtrength of a place: they are conſtructed, by biſecting the faces of the ravelin with the perpendicular LN; on which is ſet off 30 toiſes from the counterſcarp of the ditch, for one of its faces; the other face, PN, is found by making the ſemi-gorge TP of 25 toiſes; the ditch before the lunettes is 12 toiſes, the parapet 3, and the rampart 8, as in the ravelin,

There is ſometimes another work made to cover the ſaliant angle of the ravelin, ſuch as A, called *bonnet*, whoſe faces are parallel to thoſe of the ravelin, and when produced biſect thoſe of the lunettes; the ditch before it is 10 toiſes.

Plate CXI.

There are likewiſe lunettes, ſuch as D in fig. 8. whoſe faces are drawn perpendicular to thoſe of the ravelin, within a third part from the ſaliant angle; and their ſemi-gorges are only 20 toiſes.

Theſe kind of works may make a good defence, and coſt no very great expence; for as they are ſo near the ravelin, the communication with it is very eaſy, and one cannot well be maintained till they are all three taken.

5. *Conſtruction of Tenaillons.*

Fig. 9. Produce the faces of the ravelin beyond the counterſcarp of the ditch, at a diſtance MN of 30 toiſes, and take on the counterſcarp of the great ditch 15 toiſes from the re-entering angle p to q, and draw N q; then q N M p will be the tenailles required; its ditch is 12 toiſes, that is, the ſame as that of the ravelin. Sometimes there is made a retired battery in the front of the tenaillons, as in B; this battery is 10 toiſes from the front to which it is parallel, and 15 toiſes long.

There are commonly retrenchments made in the tenaillons, ſuch as O; their parapets are parallel to the fronts MN, and biſect the ſide qN; the ditch before this retrenchment is 3 toiſes: and there is a banquette before the parapet next to the ditch of about 8 feet, called *berm;* which ſerves to prevent the earth of the parapet (which ſeldom has any revetment) from falling into the ditch.

It is to be obſerved, that the ravelin, before which tenaillons are conſtructed, muſt have its ſaliant angle much greater than the former conſtruction makes them; otherwiſe the ſaliant angles of the tenaillons become too acute; for which reaſon we made the capital of this ravelin 45 toiſes, and the faces terminate within 3 toiſes of the ſhoulders.

6. *Conſtruction of Counterguards.*

Fig. 10. 11. When the counterguard is placed before the ravelin, ſet off 40 toiſes on the capital of the ravelin from the ſaliant angle A, to the ſaliant angle B, of the counterguard; and 10 from C to D, on the counterſcarp of the ditch.

When the counterguard is before the baſtion, ſuch as in fig. 2. its ſaliant angle F is 50 toiſes from the ſaliant angle E of the baſtion, and the breadth near the ditch of the ravelin 10 toiſes as before.

The ditch before the counterguards is 12 toiſes, and its counterſcarp parallel to the faces.

Counterguards are made before the ravelin on ſome particular occaſions only; but are frequently conſtructed before the baſtions, as covering the flanks wonderfully well. Some authors, as Mr Blondel and Mr Coehorn, will have them much narrower than they are here.

7. *Conſtruction of Hornworks.*

Fig. 12. Produce the capital of the ravelin beyond the ſaliant angle A, at a diſtance AB of about 80 toiſes; draw DBE at right angles to AB; in which take BD, BE, each equal to 55 toiſes; and on the exterior ſide DE, trace a front of a polygon in the ſame manner as that of the body of the place, making the perpendicular BF 10 toiſes, and the faces 30.

Plate CXI.

The branches D a, E b, of the hornwork, when produced, terminate on the faces of the baſtions, within 5 toiſes of the ſhoulders. The ditch of the hornwork is 12 toiſes, and its counterſcarp parallel to the branches; and in the front terminates at the ſhoulders, in the ſame manner as the great ditch before the baſtions.

The capital of the ravelin before the front of the hornwork is 35 toiſes, and the faces terminate on the ſhoulders, or rather 2 or 3 toiſes beyond them: and the ditch before the ravelin is 8 toiſes.

There are ſometimes retrenchments made within the hornwork, ſuch as S, S; which are conſtructed by erecting perpendiculars to the faces of the ravelins, within 25 toiſes of their extremities. This retrenchment, like all others, has a parapet turfed only with a berm of 8 feet before it; as likewiſe, a ditch from 3 to 5 toiſes broad.

Fig. 13. When a hornwork is made before the baſtion, the diſtance D L of the front from the ſaliant angle of the baſtion is 100 toiſes, and the branches terminate on the faces of the adjacent ravelins within 5 toiſes from their extremities; all the reſt is the ſame as before.

8. *Conſtruction of Crownworks.*

Pl. CXII. fig. 1.

From the ſaliant angle, A, of the ravelin, as a centre, deſcribe an arc of a circle with a radius of about 120 toiſes, cutting the capital of the ravelin produced at C; from the point C, ſet off the cords CB, CF, each of them equal to 110 toiſes: and on each of which, as an exterior ſide, conſtruct a front of a polygon of the ſame dimenſions as in the hornwork; that is, the perpendicular ſhould be 18 toiſes, the faces 30, and the branches terminate on the faces of the baſtions within 25 toiſes of the ſhoulders.

The ditch is 12 toiſes, the capital of the ravelin 35, and its ditch 8; that is, the ſame as in the hornwork.

Sometimes the crownwork is made before the baſtion, as in fig. 2. The arc is deſcribed from the ſaliant angle A of the baſtion, with a radius of 120 toiſes, as before; and the branches terminate on the faces of the adjacent ravelins within 25 toiſes of their extremities: the reſt of the dimenſions and conſtructions are the ſame as before.

Hornworks, as well as crownworks, are never made but when a large ſpot of ground falls beyond the fortification, which might be advantageous to an enemy in a ſiege, or to cover ſome gate or entrance into a town.

9. *Conſtruction of Covert-ways and Glacis.*

Although we have not hitherto mentioned the covert-way, nevertheleſs all fortifications whatſoever have one; for they are eſteemed to be one of the moſt eſſential parts of a modern fortification; and it is certain, the taking the covert-way, when it is in a good condition and well defended, is generally the moſt bloody action of the ſiege.

After having conſtructed the body of the place, and all the outworks which are thought neceſſary, lines are drawn parallel to the outmoſt counterſcarp of the ditches, at 6 toiſes diſtant from it; and the ſpace m n, m n, included between that line and the counterſcarp, will be the covert-way required.

Plate CXII.

Fig. 3. There is in every re-entering angle of the counterſcarp a place of arms, m; which is found by ſetting off 20 toiſes from the re-entering angle a, on both ſides from a to b, and from a to c; and from the points b, c, as centres, arcs are deſcribed with a radius of 25 toiſes, ſo as to interſect each other in d; then the lines drawn from this interſection to the points b, c, will be the faces of the places of arms.

If lines are drawn, parallel to the lines which terminate the covert way, and the places of arms, at 20 toiſes diſtant from them, the ſpace x, x, x, between theſe lines and thoſe which terminate the covert-way, will be the glacis.

At the extremities of the place of arms, are traverſes made, ſuch as v, v, which ſerve to incloſe them: theſe traverſes are 3 toiſes thick, and as long as the covert-way is broad; and a paſſage is cut in the glacis round them, of about 6 or 8 feet, in order to have a free communication with the reſt of the covert-way.

There are alſo traverſes of the ſame dimenſions before every ſaliant angle of the baſtion and outworks, and are in the ſame direction as the faces of thoſe works produced; and the thickneſs lies at the ſame ſide as the parapets.

The paſſages round theſe laſt traverſes are likewiſe from 6 to 8 feet wide.

In each place of arms are two ſally ports z z, which are 10 or 12 feet wide, for the troops to ſally out; in time of a ſiege they are ſhut up, with barriers or gates.

10. *Conſtruction of Arrows and Detached Redoubts.*

An arrow is a work made before the ſaliant angles of the glacis, ſuch as A, fig. 3. It is compoſed of a parapet of 3 toiſes thick, and 40 long; and the ditch before it 5 toiſes, terminating in a ſlope at both ends. The communication from the covert way into theſe arrows is 4 or 5 toiſes wide; and there is a traverſe, r, at the entrance, of 3 toiſes thick, with a paſſage of 6 or 8 feet round it.

A detached redoubt is a kind of work much like a ravelin, with flanks placed beyond the glacis; ſuch as B: they are made in order to occupy ſome ſpot of ground which might be advantageous to the beſiegers; likewiſe to oblige the enemy to open their trenches farther off than they would do otherwiſe.

Their diſtance from the covert-way ought not to exceed 120 toiſes, that it may be defended by muſket-ſhot from thence.

The gorge a b is 40 toiſes; the flanks a c, b f, which are perpendicular to the gorge, 10; and the faces c d, f d, 30: the ditch before it is 6 toiſes, ending in ſlopes at both ends; the covert-way 4; the branches of the covert-way are 42 toiſes long, or thereabouts; the faces of the places of arms y, y, which are perpendicular to the branches, 10; and the other, which is parallel to them, 14.

The communication from the covert-way into the redoubt, is 5 or 6 toiſes wide; and there is a traverſe made juſt at the entrance, and another in the middle when it is pretty long. The parapets of this communication terminate in a ſlope or glacis.

If theſe redoubts are above 50 toiſes diſtant from the covert-way, the beſiegers carry their trenches round, and enter through the gorge; by which the troops that are in them are made priſoners of war, if they do not retire betimes; to prevent which, ſome other outworks ſhould be made to ſupport them.

11. *Conſtruction of Second Ditches and Covert-ways.*

Fig. 4. When the ground is low, and water to be found, there is often a ditch about 10 or 12 toiſes made round the glacis; and oppoſite to the places of arms are conſtructed lunettes, beyond the ditch: ſuch as D, whoſe breadth on the counterſcarp of the ditch is 10 toiſes, from b to a, and from c to d; and the faces a L, d L, are parallel to thoſe of the places of arms; the ditch before them is from 8 to 10 toiſes wide.

The ſecond covert-way is 4 toiſes, the ſemi-gorges of the places of arms, m, about 15, and the faces perpendicular to the counterſcarp; the ſecond glacis is from 15 to 18 toiſes broad.

This ſecond covert-way has traverſes every where, in the ſame manner as the firſt.

12. *Conſtruction of Profiles.*

Pl. CXIII. fig. 1.

A PROFILE is the repreſentation of a vertical ſection of a work; it ſerves to ſhew thoſe dimenſions which cannot be repreſented in plans, and is neceſſary in the building of a fortification. Profiles are generally conſtructed upon a ſcale of 30 feet to an inch. It would be endleſs to deſcribe all their particular dimenſions; we ſhall therefore lay down the principal rules only, given by M. Vauban, on this ſubject.

1. Every work ought to be at leaſt 6 feet higher than that before it, ſo that it may command thoſe before it; that is, that the garriſon may fire from all the works at the ſame time, with great and ſmall arms, at the beſiegers in their approaches. Notwithſtanding this ſpecious pretence, there are ſeveral authors who object againſt it. For, ſay they, if you can diſcover the enemy from all the works, they can diſcover, by the ſame reaſon, all the works from their batteries; ſo that they may deſtroy them without being obliged to change their ſituation, and thereby diſmount all the guns of the place before they come near it.

But if all the works were of the ſame height, thoſe within cannot be deſtroyed, till ſuch time as thoſe before them are taken: guns might be placed in the covert-way and outworks to obſtruct the enemy's approach; andwhen they come near the place, they might be tranſported into the inner-works: and as the body of the place would be much lower, the expence would be conſiderably diminiſhed.

But when works are low, they are eaſily enfiladed by the ricochet batterries, which is a kind of firing with a ſmall quantity of powder, by giving the gun an elevation of 10 or 12 degrees: this might however be partly prevented, by making the parapets near the ſaliant angles, for the ſpace of 8 toiſes on each ſide, 5 or 6 feet higher than the reſt of the works.

2. The covert-way ſhould be lower than the level-ground, otherwiſe the body of the place muſt be raiſed very high, eſpecially where there are ſeveral outworks; this is to be underſtood only when the works exceed each other in height, otherwiſe it need not be below the level.

Plate CXIII.

3. The baſes of all inward ſlopes of earth ſhould be at leaſt equal to the height, if not more.

4. The baſes of all outward ſlopes of earth, two thirds of their heights.

5. The ſlopes of all walls or revetments ſhould be one fifth of their height; or one ſixth might perhaps be ſufficient: the height of a wall is eſtimated from the bottom of the ditch, and not from the beginning of its foundation.

6. The ſlopes of all parapets and traverſes are one ſixth of their breadth; that is, 3 feet towards the field; or the inſide, where the banquettes ſhould be, 3 feet higher than the outſide.

7. When the revetment of a rampart goes quite up to the top, 4 feet of the upper-part is a vertical wall of 3 feet thick, with a ſquare ſtone at the top of it, projecting 6 inches; and a circular one below, or where the ſlope begins, of 8 or 10 inches diameter: they go quite round the rampart, and the circular projection is called the *cordon*.

Where the ſtraight part of the wall ends and the ſlope begins, the wall is always made 5 feet thick; and the counterforts or buttreſſes reach no higher than that place.

7. When the rampart is partly walled, and partly turfed, then one fifth of the height which is turfed muſt be added to 5 feet, to get the thickneſs of the wall above.

And having the thickneſs of any wall above, by adding one fifth of its height from the bottom of the ditch, the ſum will be the thickneſs of the wall at the bottom; but if a ſixth part is only taken for the ſlope, then a ſixth part muſt be added.

For inſtance, ſuppoſe a rampart of 30 feet high from the bottom of the ditch, and that 10 of which are to be turfed; then the fifth part of 10, which is 2, added to 5, gives 7 for the wall above; and as this wall is 20 feet high, the fifth of which is 4, and 4 added to the thickneſs 7 above, gives 11 for the thickneſs near the foundation.

Plate CXIII. fig. 1. Repreſents, in military perſpective, the profiles of the body of a place, the ravelin and covert-way: which gives a clear idea of what is meant by a profile, and from which thoſe of all other works may be eaſily conceived.

Sect. II. *Of Irregular Fortification.*

The moſt eſſential principle in fortification, conſiſts in making all the fronts of a place equally ſtrong, ſo that the enemy may find no advantage in attacking either of the ſides. This can happen no otherwiſe in a regular fortification ſituated in a plain or even ground: but as there are but few places which are not irregular, either in their works or ſituations, and the nature of the ground may be ſuch as makes it impracticable to build them regular, without too great expence; it is ſo much the more neceſſary to ſhew in what conſiſts the ſtrength or weakneſs of a town irregularly fortified, ſo that the weakeſt part may be made ſtronger by additional outworks; as likewiſe, if ſuch a place is to be attacked, to know which is the ſtrongeſt or weakeſt part.

1. *Conſtruction of an irregular place ſituated in an open country.*

If the place to be fortified is an old town incloſed by a wall or rampart, as it moſt frequently happens, the engineer is to conſider well all the different circumſtances of the figure, ſituation, and nature of the ground; and to regulate his plan accordingly, ſo as to avoid the diſadvantages, and gain all the advantages poſſible: he ſhould examine, whether by cutting off ſome parts of the old wall or rampart, and taking in ſome ground, the place can be reduced into a regular figure, or nearly ſo; for, if that can be done without increaſing the expence conſiderably, it ſhould by no means be omitted. Old towns have often towers placed from diſtance to diſtance, as Douay, Tournay, and many other places, which are generally made uſe of, and mended when it may be done. If there is a rampart without baſtions or towers, it muſt be well conſidered, whether baſtions may not be added, or if it is not better to make only ſome outworks: if the ditch about this rampart is not too wide and deep, it would be advantageous to make detached baſtions; otherwiſe ravelins and counterguards muſt be conſtructed. Special care muſt be taken, to make all the ſides of the polygon as nearly equal as poſſible, and that the length of the lines of defence do not exceed the reach of muſket-ſhot; but if that cannot be done, thoſe ſides which are on the narroweſt part ſhould be made the longeſt.

If it ſhould happen, that ſome of the ſides are inacceſſible, or of very difficult approach, either on account of ſome precipice, marſhy ground, or inundation, they may be made much longer than the others, which are of eaſy acceſs, and the flanks need not be ſo large as the reſt; by doing ſo, there will be ſome expences ſaved, which may be uſed in making the other ſides ſtronger by adding more outworks.

There are few ſituations, but what are more advantageous in ſome parts than in others; it is therefore the buſineſs of an engineer to diſtinguiſh them, and to render thoſe ſides ſtrong by art, which are not ſo by nature.

If the ſituation is low and watery, lunettes or tenaillons, and ſuch other ſmall outworks, ſhould be conſtructed; becauſe they are not of any great expence, and may make a very good defence. But if one ſide of the place only is low, and running water is to be had, a ſecond ditch and covert-way with lunettes may be made, by obſerving, that if the firſt glacis is made to ſlope, ſo as to become even with the level of the water in the ſecond ditch; or if the water can be ſwelled by means of dykes or ſluices, ſo as to overflow the beſt part of the firſt glacis, it ſhould be done: for, by ſo doing, theſe works will be able to make a very good defence, ſince the beſiegers will find it a difficult matter to lodge themſelves upon this glacis; which cannot be done but within a few toiſes of the firſt covert-way, where the beſieged are ready to receive them, and to deſtroy their works with great advantage; whereas the enemy cannot ſupport their workmen but from the ſecond covert-way, which is too far off to be of any great ſervice to them.

But if the ſituation is of a dry nature, without any water about it, caponiers ſhould be made in the great ditch, from the curtains to the ravelin, and batteries raiſed in the entrance of the ditch before the ravelin, whoſe parapet muſt ſlope off into a glacis ſo as to afford no cover for the enemy behind them. Arrows and detached redoubts are likewiſe very proper to be uſed in ſuch a caſe; and ſometimes horn or crown-works, if it ſhould be thought convenient: but theſe works ſhould never be conſtructed, without an abſolute neceſſity, either to occupy a ſpot of ground which might be advantageous to the enemy, or to cover ſome gate or entrance into the town; for they are of great expence, and their defence ſeems not to be anſwerable to it.

Moſt of the places in Flanders are fortified with horn-works, ſuch as Ipres, Tournay, Lille, and others.

If the place to be fortified is new, and the ſituation will not admit of a regular conſtruction; particular care muſt be taken in chooſing ſuch a ſpot of ground as is moſt advantageous, and leaſt liable to any diſadvantages either in the building or in the maintaining of it. All hills or riſing grounds ſhould be avoided, which might command any part of the works; marſhy grounds, becauſe ſuch ſituations are unwholeſome; or lakes and ſtanding waters, for the ſame reaſon, excepting a lake is or may be made navigable: good water ſhould be had either within the place or near it, for it is abſolutely neceſſary for men and cattle; the air ſhould be wholeſome, otherwiſe the continual ſickneſs that may reign in ſuch a place might prevent people to come and live in it, and the garriſon would not be in a condition to defend themſelves as they ought to do: in ſhort, all the different circumſtances attending ſuch an undertaking ſhould be maturely conſidered, before a reſolution is taken to fortify any place.

When a ſituation is fixed upon, the next thing to be conſidered is, the bigneſs of the town and the number of its outworks; which muſt abſolutely depend upon the conſequence ſuch a place is of to a nation. If it is only to guard a paſs, or entrance into a country, it need not be ſo large: but if it is to be a place either to promote or to protect trade, it ſhould be large and commodious; the ſtreets ſhould be wide, and the buildings regular and convenient. As to what regards the fortification, its conſtruction ſhould depend on the nature of the ſituation; and the number of works, on the funds or expence a prince or a nation will be at; which, however, ought to be according to the benefit ariſing from ſuch a place: for, as ſuch undertakings are of very great expence, an engineer cannot be too ſparing in his works; on the contrary, the greateſt œconomy ſhould be uſed, both in regard to the number of works, and to their conſtruction. The body of the place may have (A) revetments quite up to the top, or only in part, and the reſt turfed: but as to the outworks, they ſhould have half revetments, or they may be made with turf only; as being not ſo neceſſary to prevent the place from being ſurpriſed, which may nevertheleſs make a good defence.

On Plate CXIII. fig. 2. is the plan of an octagon, one half of which is ſimilar and equal to the other half; it being ſuppoſed, that the ſituation would not admit of fortification quite regular; the exterior ſides are each 180 toiſes, and the works are conſtructed according to our method: but becauſe the ſides AB, EF, are weaker than the reſt, as has been proved before, we have added tenailles, redoubts in the ravelins, and lunettes, to render them nearly equal in ſtrength with the others; and if counter-guards were made before the baſtions A and B, it would effectually ſecure that front. Inſtead of lunettes, any other works may be made, as may be thought convenient and according to the nature of the ground. If it ſhould be judged neceſſary to add other outworks to the ravelins all round the place, care muſt be taken to add likewiſe more to the fronts AB, EF, in order to render the advantages and diſadvantages of attacking on either ſide equal.

2. *Conſtruction of an irregular place, ſituated on a hill or rock.*

In the conſtruction of ſuch places, care muſt be taken that no neighbouring hill commands any part of the works; the town ſhould always be built on the higheſt part; but if it ſhould be thought more convenient to place it lower, then the upper part muſt be fortified with a fort; the ſituation ſhould be made level as near as poſſible, by removing the earth from ſome places to fill up others; and if it cannot well be levelled without extraordinary expence, works muſt be made on the higheſt part, ſo as to command and protect the lower. The works ought to occupy all the upper part of the hill; but if it ſhould be too extenſive to be all incloſed, or ſo irregular as not to be fortified without great inconvenience, the parts which fall without ſhould be fortified with ſome detached works, and a communication with the place muſt be made either above or under ground. There ſhould be no cavity or hollow roads, within cannon-ſhot, round about the place, where the enemy might be able to approach under cover. If there ſhould happen to be a ſpring near the top of the hill, it ſhould be incloſed in the fortification; or if that cannot be done, by ſome work or other: for there is nothing more neceſſary, and at the ſame time ſcarcer, in ſuch ſituations, than water; for which reaſon there cannot be too much care in providing it: ſeveral ciſterns are to be made to receive the rain-water, and to preſerve it; wells ſhould be dug likewiſe, though ever ſo deep, the water of which will ſerve for common uſe.

Places built on hills or rocks, ſhould never be large; for their uſe is generally to guard paſſes or inlets into a country, and are ſeldom uſeful in traffic, and it is a difficult matter to provide for a large garriſon in ſuch ſituations, neither ſhould any ſuch place be built without ſome very material reaſons: but when it is abſolutely neceſſary, great care and precaution ſhould be taken to render the works as perfect as the ſituation will admit of, and at the ſame time to be as frugal in the expence as poſſible.

3. *Conſtruction of irregular fortifications ſituated near rivers, lakes, or the ſea.*

As the intent of building theſe kind of places is chiefly to facilitate and protect trade, they are of more importance than any other kind, eſpecially in maritime countries, where the principal ſtrength and power depends on them: for which reaſon, we ſhall treat of

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(A) Revetments are chiefly made to prevent a place from being ſurpriſed: outworks do not want to be made ſo; the taking them by ſurpriſe is of no great conſequence, except in a ſiege, when other cautions are uſed to prevent it.

of this conſtruction more largely than of any other.

The firſt thing to be conſidered is their ſituation, which ought to be ſuch as to afford a good harbour for ſhipping, or a ſafe and eaſy entrance in ſtormy weather; but as it is hardly poſſible to find any, where ſhips may go in and lie ſecure with all winds, care ſhould be taken to make them ſafe to enter with thoſe winds which are moſt dangerous: but it is not ſufficient that the harbour is ſafe againſt ſtormy weather, they ſhould likewiſe be ſo againſt an enemy, both by land and water; for it often happens, that ſhips are deſtroyed where it was imagined they were ſecure, which is of too great conſequence not to be provided againſt; for which reaſon, forts or batteries muſt be built in the moſt convenient places, to prevent the enemy's ſhips from coming too near, ſo as to be able to cannonade thoſe in the harbour, or fling ſhells amongſt them; and if there is any danger of an enemy's approach by land, high ramparts and edifices muſt be built, ſo as to cover them.

When a river is pretty large, and it is not convenient for making a harbour without great expence, the ſhips may ride along the ſhore; which, for that reaſon, muſt be made acceſſible for ſhips of burden: this may be done by advancing the quay into the river, if the water is too ſhallow, or by digging the river ſufficiently deep for that purpoſe.

And to prevent an enemy from coming up the river, forts muſt be built on both ſides, eſpecially when there are any turnings or windings. Antwerp is ſuch a place: for the Scheld is ſufficiently deep to carry ſhips of great burden, which may come quite near the town-wall; and ſeveral forts are built below it on both ſides, ſo that it would not be an eaſy matter for an enemy to come up the river.

When the river is but ſmall, ſo that no ſhips of burden can come thro' it; it is ſufficient to make it run thro' ſome of the works, where proper landing places are contrived, from whence the goods may be carried in to the place; as at Sarrelouis, where a hornwork is built beyond the Sarre, in the gorge of which the goods are landed.

If the breadth of the river does not exceed 200 yards, it commonly paſſes through the middle of the town, and proper quays are made on each ſide; in ſuch a caſe, the fortification is ſo contrived, as that the river paſſes through the curtain, in order to have a baſtion on each ſide to defend the coming in and going out.

When M. Vauban fortified near rivers, he made always the exterior ſide near the water much longer than any of the others; ſuch as Hunninghen on the Rhine, and Sarrelouis on the Sarre; but for what reaſon he fortified theſe places in that manner, has not been told by any author.

But it is plain that the ſides which terminate at the river, are the weakeſt; becauſe the beſiegers trenches being ſecured by the river, they may draw moſt of their troops off, and act therefore with more vigour and ſtrength on the other ſide: beſides, as the ſtrength of a ſide increaſes in proportion as the angle of the polygon is greater, by making the ſide next the river longer, the angles at its extremities become wider, and conſequently the adjacent ſides ſtronger.

Plate CXIII.

There are other advantages, beſides thoſe mentioned already, which ariſe from the lengthening that ſide: for if the river is pretty deep ſo as not to be fordable, that ſide is not liable to be attacked; and by increaſing its length, the capacity of the place increaſes much more in proportion to the expence, than if more ſides were made; the centre of the place will be likewiſe nearer the river, which makes it more convenient for tranſporting the goods from the water-ſide to any part of the town.

Fig. 3.

To illuſtrate this method of M. Vauban's, we ſhall give the plan of Hunninghen: this place was built for the ſake of having a bridge over the Rhine, for which reaſon he made it only a pentagon; the ſide AB next to the river is 200 toiſes, and each of the others but 180.

About the ſpace *a b c*, which lies before the front AB, is a ſtone wall; and the paſſages *x*, *x*, are ſhut up with ſluices, to retain the water in the ditches in dry ſeaſons: and to prevent an enemy from deſtroying the ſluice near the point c, whereby the water would run out and leave the ditches dry, the redoubt *y* was built in the little iſland hard by, in order to cover that ſluice; without which precaution the place might be inſulted from the river ſide, where the water is ſhallow in dry ſeaſon.

The hornwork K beyond the Rhine was built to cover the bridge; but as this work cannot be well defended croſs the river, the hornwork H was made to ſupport the other.

Before finiſhing the deſcription of this plan, we ſhall ſhew how to find the long ſide AB.

After having inſcribed the two ſides GE, GF, in a circle, draw the diameter CD, ſo as to be equally diſtant from the line joining the points E, F, that is parallel to it; on this diameter ſet off 100 toiſes on each ſide of the centre; from theſe points draw two indefinite perpendiculars to the diameter; then if from the points E, F, as centres, two arcs are deſcribed with a radius of 180 toiſes, their interſections A and B, with the ſaid perpendiculars, will determine the long ſide AB, as likewiſe the other two FB and EA. In like manner may be found the long or ſhort ſide of any polygon whatſoever.

When a place near a river is to be fortified, for the ſafety of commerce, particular care ſhould be taken in leaving a good ſpace between the houſes and the water-ſide, to have a key or landing place for goods brought by water; it ſhould alſo be contrived to have proper places for ſhips and boats to lie ſecure in ſtormy weather, and in time of a ſiege: and as water-carriage is very advantageous for tranſporting goods from one place to another, as likewiſe for bringing the neceſſary materials, not only for building the fortification, but alſo the place itſelf, the expences will be leſſened conſiderably when this convenience can be had; for which reaſon, places ſhould never be built any where elſe but near rivers, lakes, or the ſea; excepting in extraordinary caſes, where it cannot be avoided.

Fig. 10.

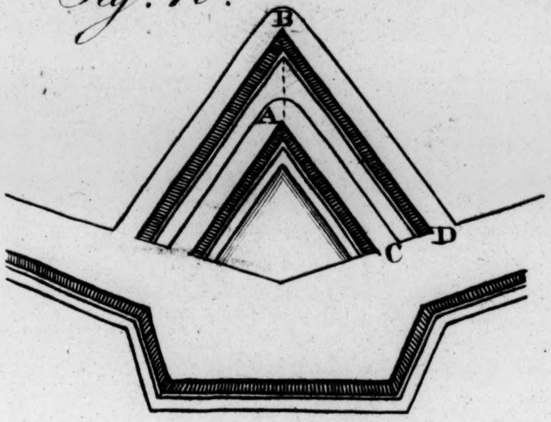


Fig. 3.

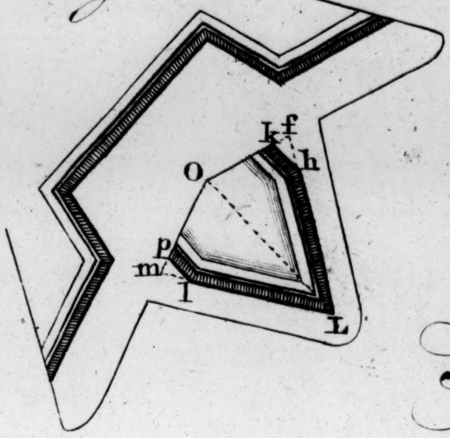


Fig. 2.

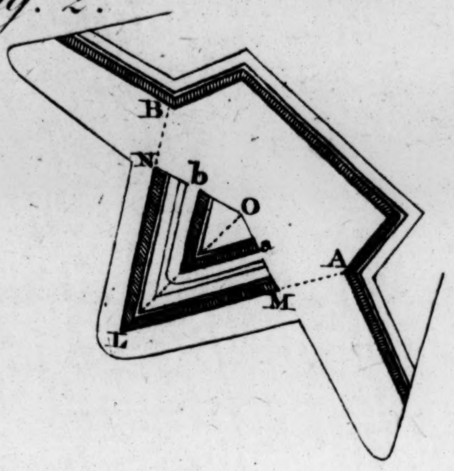


Fig. 1.

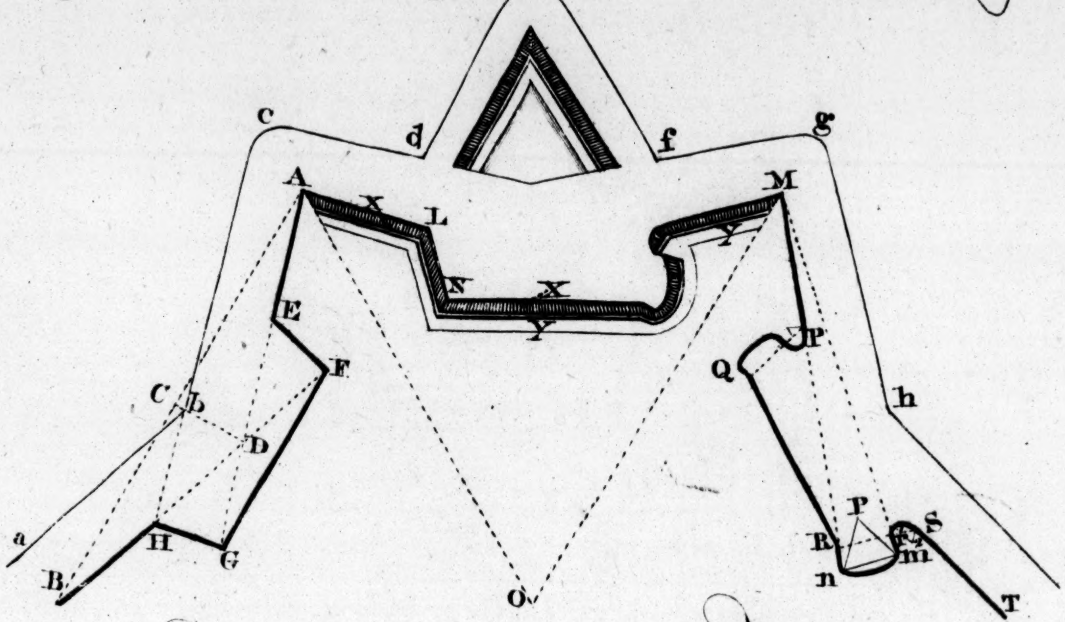

e
c
d
f
g
A
X
L
M
Y
N
X
Y
E
F
P
Q
h
C
b
D
a
B
H
G
O
P
R
n
m
S
T

Fig. 11.

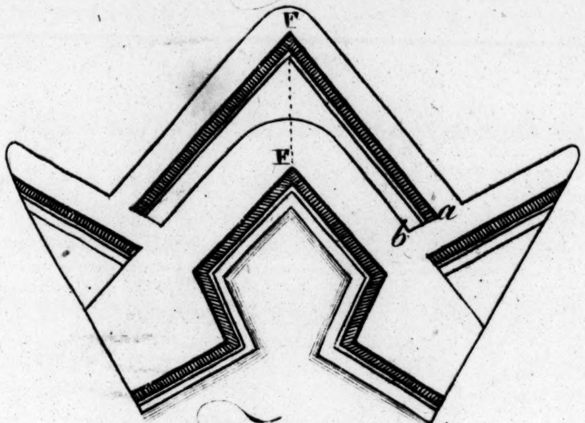


Fig. 12.

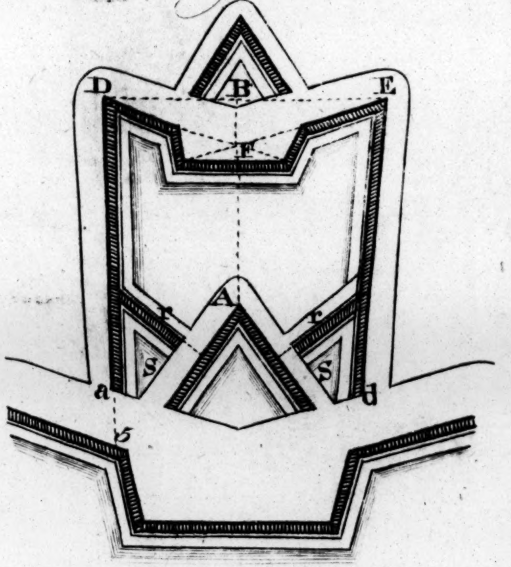

D
B
E
F
A
r
r
S
S
a
5
d

Fig. 6.

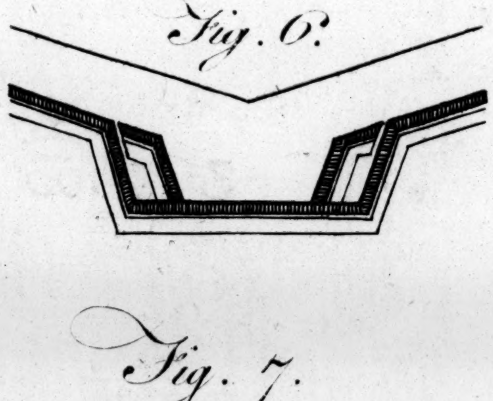


Fig. 9.

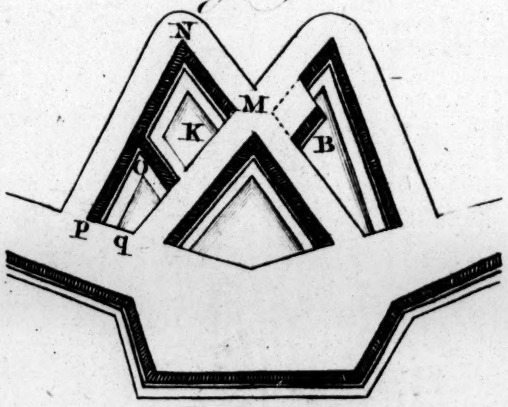
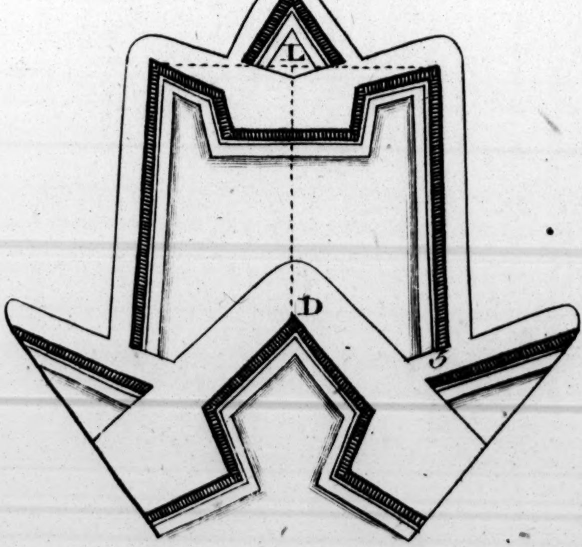


Fig. 13.



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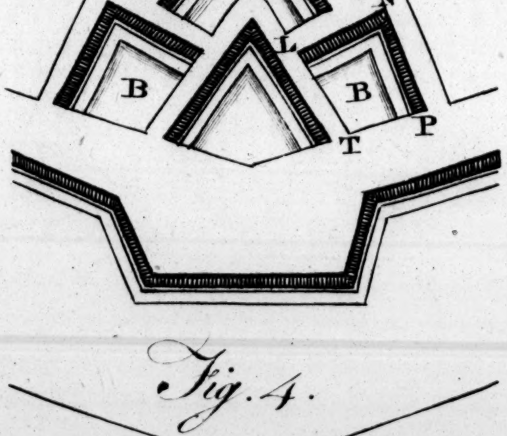


Fig. 8.

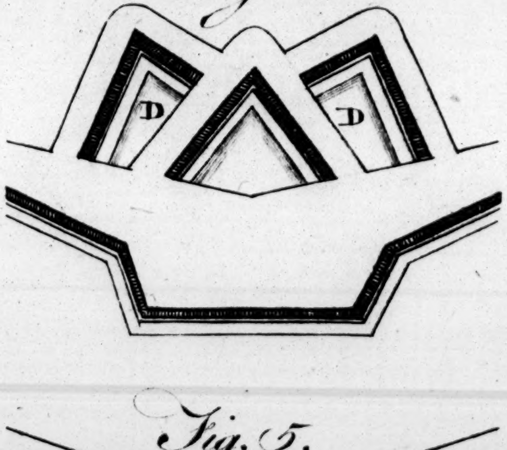


Fig. 4.

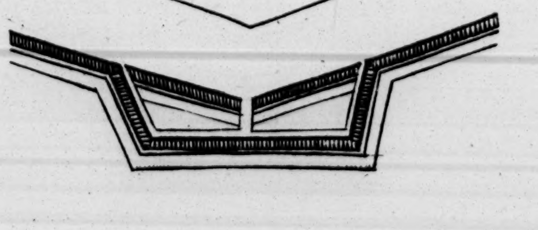
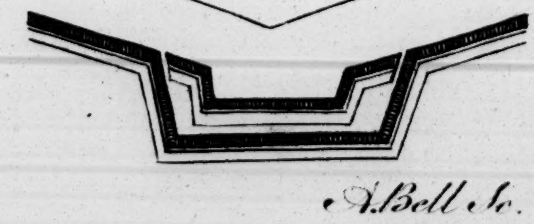


Fig. 5.



A. Bell Sc.

3. MA 53

Fig. 1.

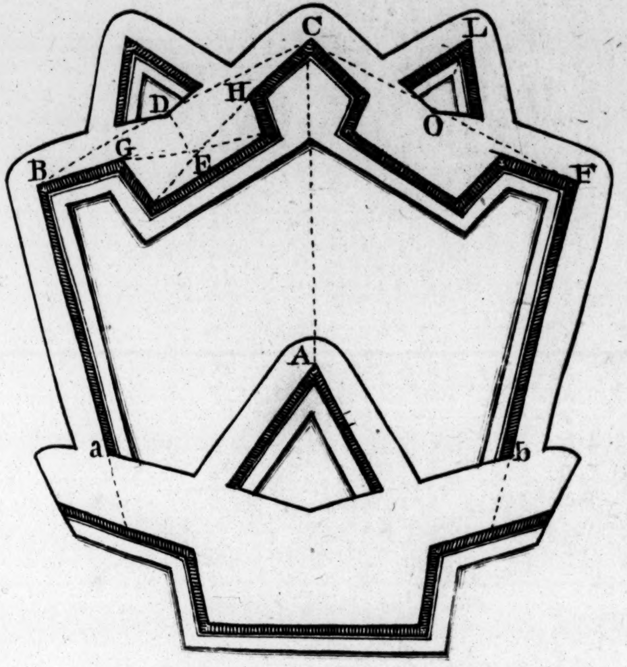
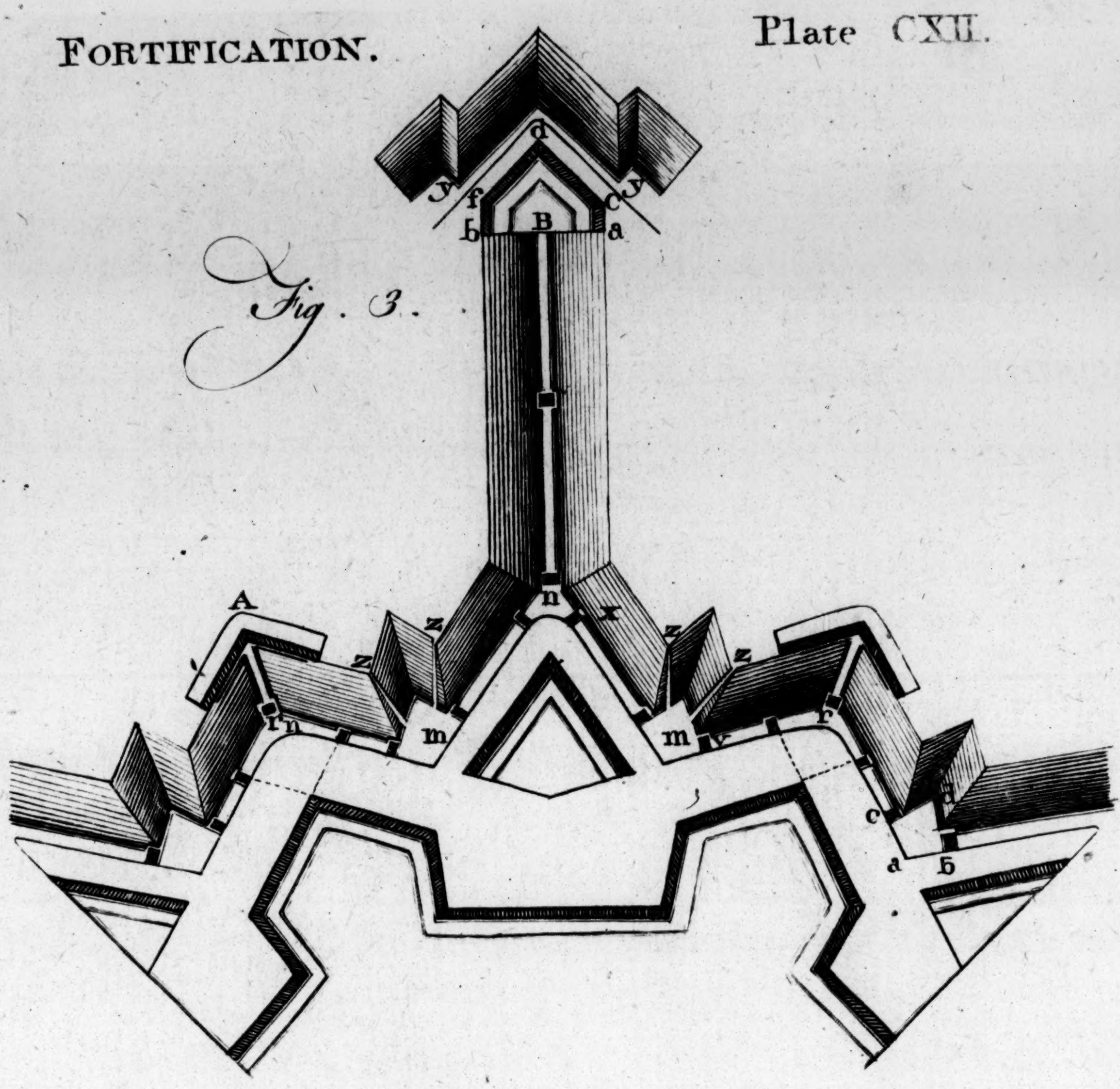

C
L
D
H
O
B
G
E
F
A
a
b

Fig. 3.


d
y
f
c
y
b
B
a
A
n
x
z
z
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z
z
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m
m
v
r
c
a
b

Fig. 2.

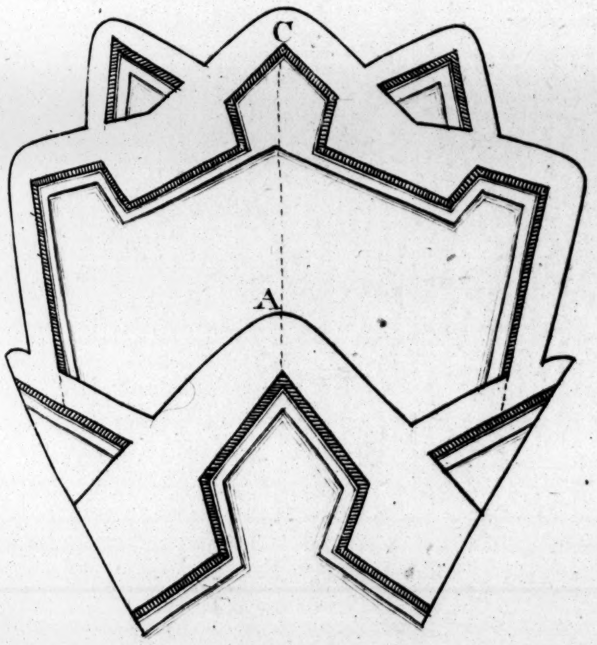
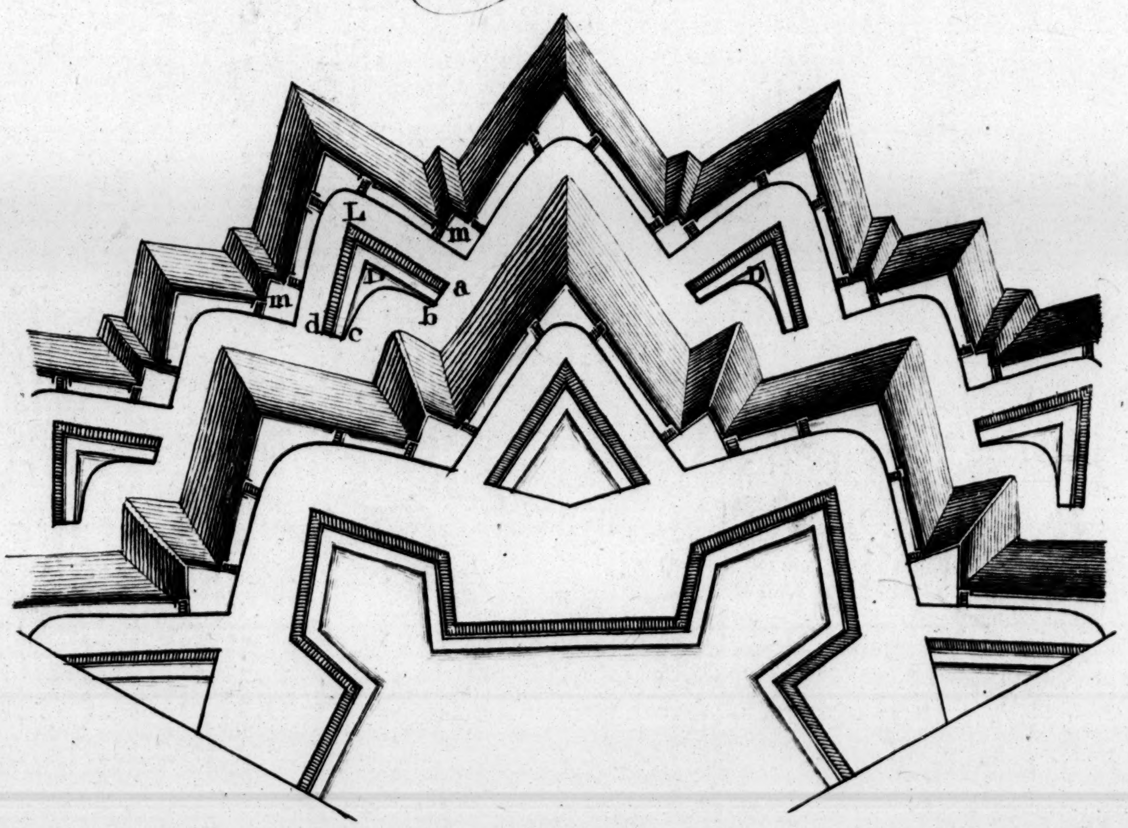


Fig. 4.



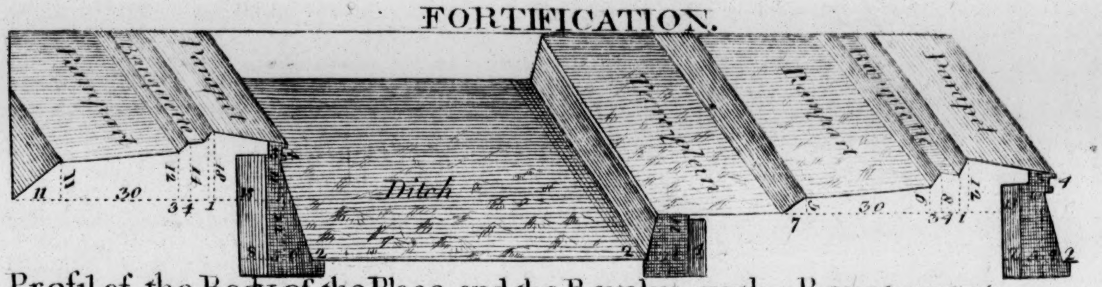
A. Bell Sculp^t.

3 MA 53

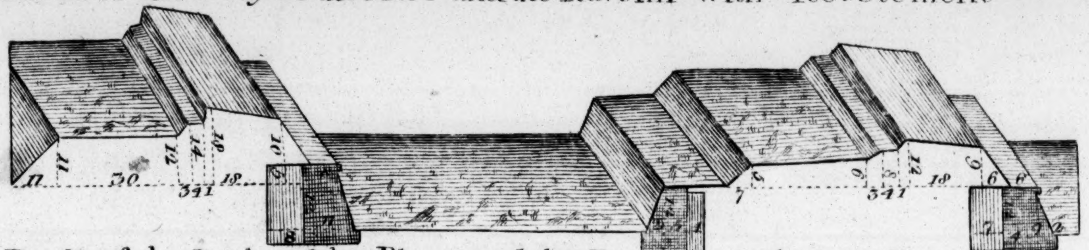
FORTIFICATION.

Plate CXIII.

Fig. 1.


Rampart
Banquette
Parapet
Ditch
Terre plein
Rampart
Banquette
Parapet
11
30
3 4 1
7
30
3 4 1

Profil of the Body of the Place and the Ravelin with Revetement


11
30
3 4 1
18
7
3 4 1
18

Profil of the Body of the Place and the Ravelin with demi-Revetement

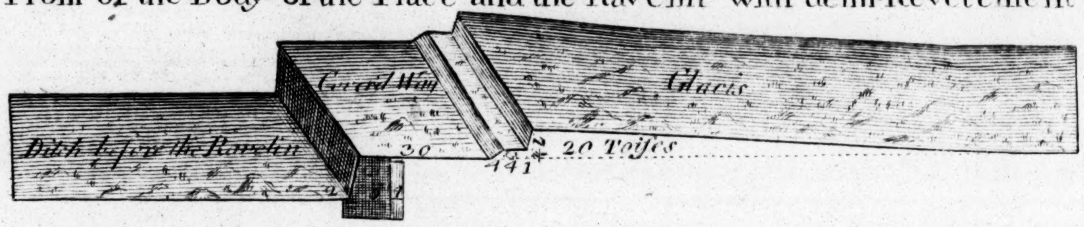

Covert Way
Glacis
Ditch before the Ravelin
30
4 4 1
20 Toises

Fig. 2.

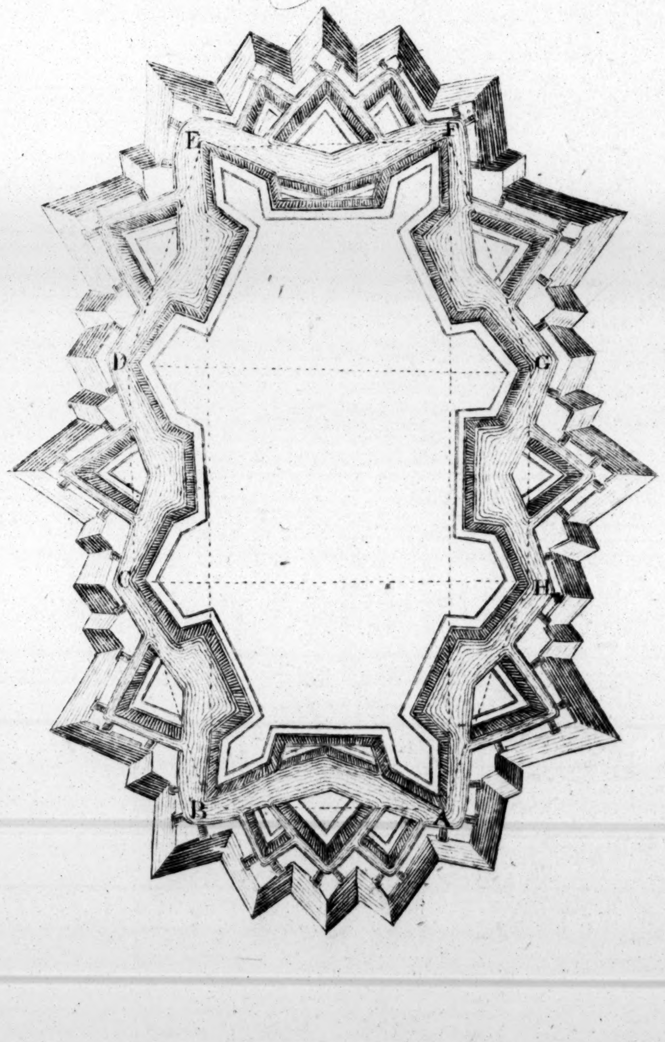
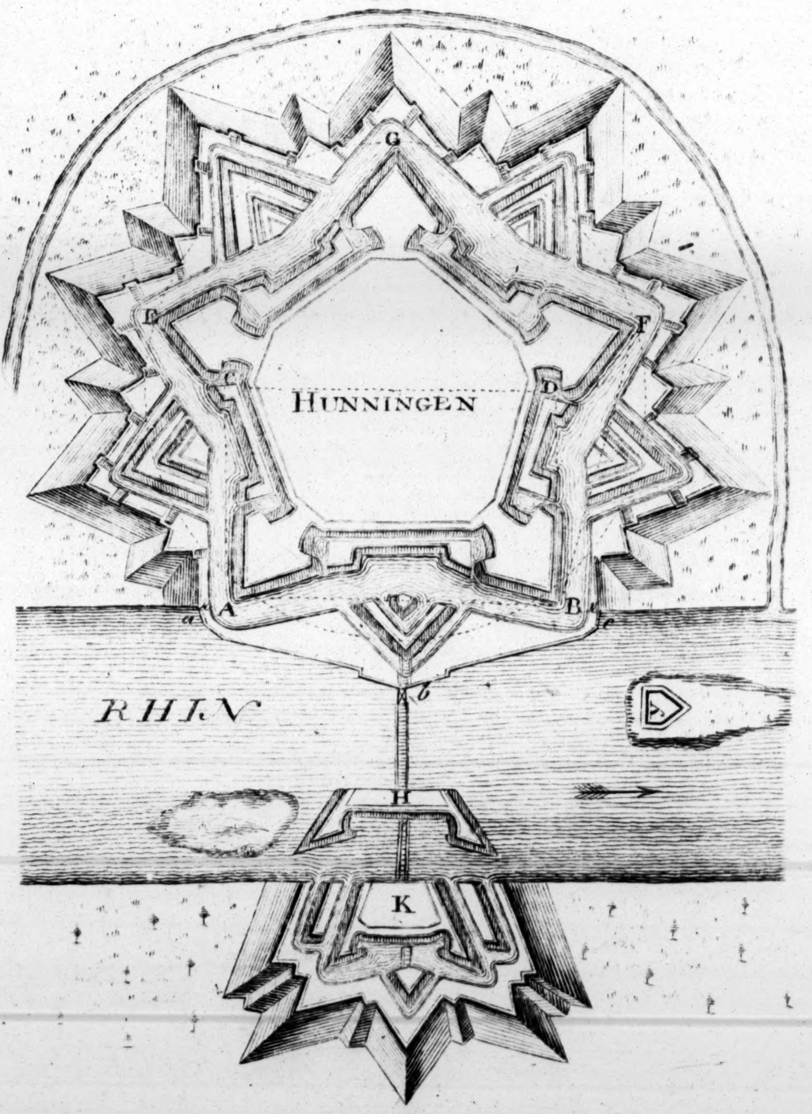


Fig. 3.


G
E
F
D
D
HUNNINGEN
a
A
B
e
b
RHIN
H
K

A. Bell sc.

3 MA 53

FORTIN, Fortelet, or *Field-Fort*, a ſconce or little fort, whoſe flanked angles are generally 120 fathoms diſtant from one another. See Fort.

The extent and figure of fortins are different, according to the ſituation and nature of the ground; ſome of them having whole baſtions, and others demi-baſtions. They are made uſe of only for a time, either to defend the lines of circumvallation, or to guard ſome paſſage or dangerous poſt.

FORTISSIMO, in muſic, ſometimes denoted by FFF, or *fff*, ſignifies to ſing or play very loud or ſtrong.

FORTITUDE, the ſame with courage or bravery. See Morals, n° 117.

FORTUNATE-islands, in ancient geography, certain iſlands, (concerning the ſituation of which authors are not agreed), famous for the golden apples of the Hesperides.—The common opinion is, that they are the Canary Iſlands.

FORTUNE, fortuna, a goddeſs worſhipped with great devotion by the ancient Greeks and Romans; who believed her to preſide over human affairs, and to diſtribute wealth and honour at her pleaſure. The Greeks had a great number of temples dedicated to Fortune, under the name of τυχη. The poet Pindar makes her one of the Parcæ, or deſtinies, and the daughter of Jupiter. Ancus Martius, king of the Romans, was the firſt who built a temple at Rome to this deity, under the name of *Fortuna Virilis*, on account that courage, no leſs than good-fortune, is requiſite to obtain a victory. Servius Tullius built a temple to Fortune, under the name of *Primogenia*. The Romans gave ſeveral other appellations to Fortune, ſuch as *Fortuna Libera*, *Redux*, *Publica*, &c.

There was a ſtatue of Fortune at Athens, holding betwixt her arms Plutus the god of riches. Pauſanias ſays, that her moſt ancient form was that which Bupalus made in Greece, in ſhape of a woman with a round ball on her head, and a cornucopia under her arm. Macrobius ſays, that ſhe was firſt ſet forth with wings on her ſhoulders, having by her ſide the rudder of a ſhip; and that ſhe was placed upon a wheel, and had in her right hand a golden ball, and in her left a whip. In Egypt ſhe was painted like a woman, turning a great glaſs wheel, on the top of which were repreſented a great number of men playing, others climbing up, and others having attained the ſummit of the wheel, precipitating themſelves and falling down again. Modern painters repreſent Fortune by a naked woman ſtanding on a globe, with a bandage on her eyes.—Horace's deſcription of this goddeſs, and her great power, may be ſeen in Ode xxxv. lib. i. Juvenal, in Satire x. 365. calls Fortune the *deity of fools*.

Fortune-*Tellers*. Perſons pretending to tell fortunes are to be puniſhed with a year's impriſonment, and ſtanding four times on the pillory. *Stat.* 9 *Geo.* II. *c.* 5.

FORTY-days *Court*, the court of *attachment* or *woodmote*, held before the verderors of the foreſt once every forty days, to inquire concerning all offenders againſt vert and veniſon. See Forest.

FORUM, in Roman antiquity, a public ſtanding place within the city of Rome, where cauſes were judicially tried, and orations delivered to the people.

Forum, was alſo uſed for a place of traffic, anſwering to our market-place: of theſe there were vaſt numbers, as the *forum piſcarium*, *olitorium*, &c. Theſe were generally called *fora venalia*; in contradiſtinction to the former, which were called *fora civilia*.

Forum, is alſo uſed, among caſuiſts, &c. for juriſdiction; thus they ſay, *In foro legis*, &c.

FOSS, or Fossa, in anatomy, a kind of cavity in a bone, with a large aperture, but no exit or perforation.

Foss, in fortification, a hollow place, commonly full of water, lying between the ſcarp and counterſcarp, below the rampart; and turning round a fortified place or a poſt, that is to be defended. See Moat.

Foss-*Way*, one of the four principal highways of England, that anciently led through the kingdom, ſuppoſed to be made by the Romans, having a ditch upon one ſide thereof.

FOSSARII, in antiquity, a ſort of officers in the eaſtern church, whoſe buſineſs it was to inter the dead.

St Jerom aſſures us, that the rank of the foſſarii held the firſt place among the clerks: but he is to be underſtood of thoſe clerks only who had the direction and intendance of the interment of the devout. Some authors inſinuate, that the foſſarii were inſtituted in the time of the apoſtles.

FOSSIL, in natural hiſtory, denotes, in general, every thing dug out of the earth, whether they be natives thereof, as metals, ſtones, ſalts, earths, and other minerals; or extraneous, repoſited in the bowels of the earth by ſome extraordinary means, as earthquakes, the deluge, &c. See Metal, Stone, &c.

Native foſſils, according to Dr Hill, are ſubſtances found either buried in the earth, or lying on its ſurface, of a plain ſimple ſtructure, and ſhewing no ſigns of containing veſſels or circulating juices. Theſe are ſubdivided, by the ſame author, 1. Into foſſils naturally and eſſentially ſimple. Of theſe, ſome are neither inflammable, nor ſoluble in water; as ſimple earths, talcs, fibrariæ, gypſum, ſelenitæ, cryſtal, and ſpars: others, though uninflammable, are ſoluble in water; as all the ſimple ſalts: and others, on the contrary, are inflammable, but not ſoluble in water; as ſulphur, auripigmentum, zarnich, amber, ambergreaſe, gagates, aſphaltum, ampelites, lithanthrax, naphtha, and piſſaſphalta. 2. The ſecond general ſubdiviſion of foſſils comprehends all ſuch as are naturally compound, but unmetallic. Of theſe, ſome are neither inflammable, nor ſoluble in water; as compound earths, ſtones, ſeptariæ, ſiderochita, ſcrupi, ſemipellucid gems, lithidia, coniſſalæ, and pellucid gems: others are ſoluble in water, but not inflammable; as all the metallic ſalts: and, laſtly, ſome are inflammable, but not ſoluble in water; as the marcaſites, pyritæ, and phlogonia. 3. The third, and laſt, general diviſion of foſſils comprehends all the metallic ones; which are bodies naturally hard, remarkable heavy, and fuſible in fire. Of theſe, ſome are perfectly metallic, as being malleable when pure; ſuch are gold, lead, ſilver, copper, iron, and tin: others are imperfectly metallic, as not being malleable even in their pureſt ſtate; ſuch are antimony, biſmuth, cobalt, zinc, and quickſilver or mercury. Of all which ſubſtances, the reader will find a particular deſcription under their reſpective heads, Earth, Talc, Mercury, Gypsum, &c.

Extraneous foſſils are bodies of the vegetable or animal kingdoms accidentally buried in the earth. Of the vegetable kingdom, there are principally three kinds, trees or parts of them, herbaceous plants, and corals; and of the animal kingdom there are four kinds, ſea-ſhells, the teeth or bony palates and bones of fiſhes, complete fiſhes, and the bones of land-animals. See TREE, WOOD, PLANT, SHELL, &c.

As to the reaſon why theſe extraneous foſſils come to be lodged in the bowels of the earth, the common opinion is, that this great change was effected by the univerſal deluge. See DELUGE.

FOSTER (Dr James), a moſt diſtinguiſhed and popular diſſenting miniſter, born at Exeter in 1697. He began to preach in 1718; and ſtrong diſputes ariſing ſoon after, among the diſſenters, concerning the Trinity and ſubſcription to teſts, his judgment determining him to the obnoxious opinions, the clamour grew loud againſt him, and occaſioned more than one removal. His talents were hid among obſcure country congregations, until 1724; when he was choſen to ſucceed Dr Gale in Barbican, where he laboured as paſtor above 20 years. The Sunday evening-lecture, begun in the Old Jury meeting-houſe in 1728, and which he conducted with ſuch uncommon applauſe for more than 20 years, indiſputably ſhewed his abilities as a preacher. Perſons of all perſuaſions and ranks in life flocked to hear him: and Mr Pope has honoured him with a commendatory couplet in his ſatires; which, however, his commentator laboured to deſtroy the intention of by a frivolous note. In 1746, he attended the unhappy lord Kilmarnock, at his execution on Tower-hill; an office which thoſe who lived with him imagined made too deep an impreſſion on his ſympathizing ſpirit, as his vivacity abated from that time. He died in 1753; after having publiſhed ſeveral valuable compoſitions and ſermons; particularly, 1. A defence of Chriſtianity, againſt "Tindal's Chriſtianity as old as the Creation." 2. An eſſay on fundamentals. 3. Four volumes of ſermons. 4. Diſcourſes on natural religion and ſocial virtue, in 4to.

FOSTER (Samuel), an ingenious Engliſh mathematician of the laſt century, and aſtronomical profeſſor in Greſham college, was one of that learned aſſociation which met for cultivating the new philoſophy during the political confuſions, and which Charles II. eſtabliſhed into the Royal Society. Mr Foſter, however, died in 1652, before this incorporation took place; but wrote a number of mathematical and aſtronomical treatiſes, too many to particularize.—There were two other mathematical ſtudents of this name; William Foſter, a diſciple of Mr Oughtred, who taught in London; and Mark Foſter, author of a treatiſe on trigonometry, who lived later than the former two.

FOTHERGILL (Dr George), was born in Weſtmoreland in 1705, where his family had been long ſeated on a competent eſtate that had deſcended regularly for ſeveral generations. After an academical education in Queen's college, Oxford, of which he became a fellow, he was, in 1751, elected principal of St Edmund's-hall, and preſented to the vicarage of Brumley in Hampſhire. Having been long afflicted with an aſthma, he died in 1760. He was the author of a collection of much eſteemed ſermons, in 2 vols 8vo. The firſt volume conſiſts of occaſional diſcourſes, publiſhed by himſelf; the ſecond printed from his MSS.

FOTHERING, a peculiar method of endeavouring to ſtop a leak in the bottom of a ſhip while ſhe is afloat, either under ſail, or at anchor. It is uſually performed in the following manner: A baſket is filled with aſhes, cinders, and choped rope-yarns, and looſely covered with a piece of canvas; to this is faſtened a long pole, by which it is plunged repeatedly in the water, as cloſe as poſſible to the place where the leak is conjectured to lie. The oakhum or chopped rope-yarns being thus gradually ſhaken through the twigs, or over the top of the baſket, are frequently ſucked into the hole along with the water, ſo that the leak becomes immediately choaked; and the future entrance of the water is thereby prevented.

FOUGADE, or FOUGASSE, in the art of war, a little mine, about 8 or 10 feet wide, and 10 or 12 deep, dug under ſome work or poſt, which is in danger of falling into the enemy's hands; and charged with ſacks of powder, covered with ſtones, earth, and whatever elſe can make great deſtruction. It is ſet on fire like other mines, with a sauciſſe. See MINE.

FOUL, or FOULE, in the ſea-language, is uſed when a ſhip has been long untrimmed, ſo that the graſs-weeds, or barnacles, grow to her ſides under water. A rope is alſo foul when it is either tangled in itſelf, or hindered by another, ſo that it cannot run or be over-hawled.

FOUL imports, alſo, the running of one ſhip againſt another. This happens ſometimes by the violence of the wind, and ſometimes by the careleſſneſs of the people on board, to ſhips in the ſame convoy, and to ſhips in port by means of others coming in. The damages occaſioned by running foul, are of the nature of thoſe in which both parties muſt bear a ſhare. They are uſually made half to fall upon the ſufferer, and half upon the veſſel which did the injury: but in caſes where it is evidently the fault of the maſter of the veſſel, he alone is to bear the damage.

FOUL-*Water*. A ſhip is ſaid to make foul-water, when, being under ſail, ſhe comes into ſuch ſhoal-water, that though her keel do not touch the ground, yet it comes ſo near it, that the motion of the water under her raiſes the mud from the bottom.

FOUL is alſo a diſeaſe in cattle, proceeding from blood, and a wateriſh rheum that falls down into the legs, and makes them ſwell.

FOUL or *Pimpled Face*. See GUTTA *Roſacea*.

FOULA, or FOUL *Iſland*, one of the Shetland iſles, lying between ſix and ſeven leagues weſt from the main-land. It is about three miles long, narrow, and full of rough, ſteep, and bare rocks; one of which is ſo large, and runs up to ſuch an height, that it may be clearly ſeen from Orkney. This, therefore, may be reckoned with the greateſt probability to be the *Thule* of Tacitus, whatever might be the Thule of the Phenicians and Greeks. It has ſcarce any paſturage, and but very little arable land; but that, however ſmall in extent, is very fertile, out of the produce of which, with fowl and fiſh, the poor inhabitants ſubſiſt. They have nothing that can be called a port; and the only commodities they have are ſtock-fiſh, train-oil, and feathers.

FOUMART, in zoology, a ſpecies of MUSTELA.

FOUNDATION, in architecture, is that part of a building which is under-ground. See ARCHITECTURE, nº 101,—112. 129, &c.

Palladio allows a ſixth part of the height of the whole building for the hollowing or under-digging; unleſs there be cellars underground, in which caſe he would have it ſomewhat lower.

Foundation, denotes alſo a donation or legacy, either in money or lands, for the maintenance and ſupport of ſome community, hoſpital, ſchool, &c.

Jacob's Law Dict.

The king only can *found* a college, but there may be a college in reputation founded by others. If it cannot appear by inquiſition who it was that founded a church or college, it ſhall be intended that it was the king, who has power to found a new church, &c. The king may found and erect an hoſpital, and give a name to the houſe upon the inheritance of another, or licenſe another perſon to do it upon his own lands; and the words *fundo*, *creo*, &c. are not neceſſary in every foundation, either of a college or hoſpital, made by the king; but it is ſufficient if there be words equivalent: the incorporation of a college or hoſpital is the very foundation; but he who endows it with lands is the founder; and to the erection of an hoſpital, nothing more is requiſite but the incorporation and foundation. Perſons ſeiſed of eſtates in fee-ſimple, may erect and found hoſpitals for the poor by deed enrolled in chancery, &c. which ſhall be incorporated, and ſubject to ſuch viſitors as the founder ſhall appoint, &c. ſtat. 39 *Eliz. c.* 5.

FOUNDER, in a general ſenſe, the perſon who lays a foundation, or endows a church, ſchool, religious houſe, or other charitable inſtitution. See Foundation.

Founder, alſo implies an artiſt who caſts metals, in various forms, for different uſes, as guns, bells, ſtatues, printing-characters, candleſticks, buckles, &c. whence they are denominatd gun-founders, bell-founders, figure-founders, letter-founders, founders of ſmall works, &c. See Foundery.

Founder, in the ſea-language: A ſhip is ſaid to founder, when by an extraordinary leak, or by a great ſea breaking in upon her, ſhe is ſo filled with water, that ſhe cannot be freed of it; ſo that ſhe can neither veer nor ſteer, but lie like a log; and not being able to ſwim long, will at laſt ſink.

FOUNDERED, in farriery. See there, § xli.

FOUNDERY, or **Foundry**, the art of caſting all ſorts of metals into different forms. It likewiſe ſignifies the work-houſe or ſmelting-hut wherein theſe operations are performed.

Foundery *of Small-works*, or *Caſting in Sand*. The ſand uſed for caſting ſmall-works is at firſt of a pretty ſoft, yellowiſh, and clammy nature: but it being neceſſary to ſtrew charcoal-duſt in the mould, it at length becomes of a quite black colour. This ſand is worked over and over, on a board, with a roller, and a ſort of knife; being placed over a trough to receive it, after it is by theſe means ſufficiently prepared.

This done, they take a wooden board of a length and breadth proportional to the things to be caſt, and putting a ledge round it, they fill it with ſand, a little moiſtened, to make it duly cohere. Then they take either wood or metal models of what they intend to caſt, and apply them ſo to the mould, and preſs them into the ſand, as to leave their impreſſion there. Along the middle of the mould is laid half a ſmall braſs cylinder, as the chief canal for the metal to run through, when melted, into the models or patterns; and from this chief canal are placed ſeveral others, which extend to each model or pattern placed in the frame. Aſter this frame is finiſhed, they take out the patterns, by firſt looſening them all round, that the ſand may not give way.

Then they proceed to work the other half of the mould with the ſame patterns in juſt ſuch another frame; only that it has pins, which, entering into holes that correſpond to it in the other, make the two cavities of the pattern fall exactly on each other.

The frame, thus moulded, is carried to the melter; who, after extending the chief canal of the counterpart, and adding the croſs canals to the ſeveral models in both, and ſtrewing mill-duſt over them, dries them in a kind of oven for that purpoſe.

Both parts of the mould being dry, they are joined together by means of the pins; and to prevent their giving way, by reaſon of the melted metal paſſing thro' the chief cylindrical canal, they are ſcrewed or wedged up like a kind of preſs.

While the moulds are thus preparing, the metal is fuſing in a crucible of a ſize proportionate to the quantity of metal intended to be caſt.

When the moulds are cooliſh, the frames are unſcrewed, or unwedged, and the caſt work taken out of the ſand, which ſand is worked over again for other caſtings.

Foundery *of Statues*. The caſting of ſtatues depends on the due preparation of the pit, the core, the wax, the outer mould, the inferior furnace to melt off the wax, and the upper to fuſe the metal. The pit is a hole dug in a dry place ſomething deeper than the intended figure, and made according to the prominence of certain parts thereof. The inſide of the pit is commonly lined with ſtone, or brick; or, when the figure is very large, they ſometimes work on the ground, and raiſe a proper fence to reſiſt the impulſion of the melted metal.

The inner mould, or core, is a rude maſs to which is given the intended attitude and contours. It is raiſed on an iron grate, ſtrong enough to ſuſtain it, and is ſtrengthened within by ſeveral bars of iron. It is generally made either of potter's clay, mixed with hair and horſe-dung; or of plaſter of Paris mixed with brick-duſt. The uſe of the core is to ſupport the wax, the ſhell, and leſſen the weight of the metal. The iron bars and the core are taken out of the braſs figure through an aperture left in it for that purpoſe, which is ſoldered up afterwards. It is neceſſary to leave ſome of the iron bars of the core, that contribute to the ſteadineſs of the projecting part, within the braſs figure.

The wax is a repreſentation of the intended ſtatue. If it be a piece of ſculpture, the wax ſhould be all of the ſculptor's own hand, who uſually forms it on the core: Though it may be wrought ſeparately in cavities, moulded on a model, and afterwards arranged on the ribs of iron over the grate; filling the vacant ſpace in the middle with liquid plaſter and brick-duſt, whereby the inner core is proportioned as the ſculptor carries on the wax.

When the wax, which is the intended thickneſs of the metal, is finiſhed, they fill ſmall waxen tubes perpendicular to it from top to bottom, to ſerve both as canals for the conveyance of the metal to all parts of the work; and as vent-holes, to give paſſage to the air, which would otherwiſe occaſion great diſorder when the hot metal came to encompaſs it.

The work being brought thus far, muſt be covered with its ſhell, which is a kind of cruſt laid over the wax, and which being of a ſoft matter, eaſily receives the impreſſion of every part, which is afterwards communicated to the metal upon its taking the place of the wax, between the ſhell and the mould. The matter of this outer mould is varied according as different layers are applied. The firſt is generally a compoſition of clay, and old white crucibles well ground and ſifted, and mixed up with water to the conſiſtence of a colour fit for painting; accordingly they apply it with a pencil, laying it ſeven or eight times over, and letting it dry between whiles. For the ſecond impreſſion, they add horſe-dung and natural earth to the former compoſition. The third impreſſion is only horſe-dung and earth. Laſtly, the ſhell is finiſhed by laying on ſeveral more impreſſions of this laſt matter, made very thick with the hand.

The ſhell, thus finiſhed, is ſecured by ſeveral iron girts, bound round it, at about half a foot diſtance from each other, and faſtened at the bottom to the grate under the ſtatue, and at top to a circle of iron where they all terminate.

If the ſtatue be ſo big that it would not be eaſy to move the moulds with ſafety, they muſt be wrought on the ſpot where it is to be caſt. This is performed two ways: in the firſt, a ſquare hole is dug under ground, much bigger than the mould to be made therein, and its inſide lined with walls of free-ſtone or brick. At the bottom is made a hole of the ſame materials with a kind of furnace, having its aperture outwards: in this is a fire made to dry the mould, and afterwards melt the wax. Over this furnace is placed the grate, and upon this the mould, &c. formed as above. Laſtly, at one of the edges of the ſquare pit, is made another large furnace to melt the metal. In the other way, it is ſufficient to work the mould above ground, but with the like precaution of a furnace and grate underneath. When finiſhed, four walls are to be run around it, and by the ſide thereof a maſſive made for a melting-furnace. For the reſt the method is the ſame in both. The mould being finiſhed, and incloſed as deſcribed, whether under ground or above it, a moderate fire is lighted in the furnace under it, and the whole covered with planks, that the wax may melt gently down, and run out at pipes contrived for that purpoſe, at the foot of the mould, which are afterwards exactly cloſed with earth, ſo ſoon as the wax is carried off. This done, the hole is filled up with bricks thrown in at random, and the fire in the furnace augmented, till ſuch time as both the bricks and mould become red hot. After this, the fire being extinguiſhed, and every thing cold again, they take out the bricks and fill up their place with earth moiſtened, and a little beaten to the top of the mould, in order to make it the more firm and ſteady. Theſe preparatory meaſures being duly taken, there remains nothing but to melt the metal, and run it into the mould. This is the office of the furnace above deſcribed, which is commonly made in the form of an oven with three apertures, one to put in the wood, another for a vent, and a third to run the metal out at. From this laſt aperture, which is kept very cloſe, while the metal is in fuſion, a ſmall tube is laid, whereby the melted metal is conveyed into a large earthen baſon, over the mould, into the bottom of which all the big branches of the jets, or caſts, which are to convey the metal into all the parts of the mould, are inſerted.

Theſe caſts or jets are all terminated with a kind of plugs, which are kept cloſe, that, upon opening the furnace, the braſs, which guſhes out with violence, may not enter any of them, till the baſon be full enough of matter to run into them all at once. Upon which occaſion they pull out the plugs, which are long iron rods with a head at one end, capable of filling the whole diameter of each tube. The whole of the furnace is opened with a long piece of iron fitted at the end of each pole, and the mould filled in an inſtant. This completes the work in relation to the caſting part; the reſt being the ſculptor's or carver's buſineſs, who, taking the figure out of the mould and earth wherewith it is encompaſſed, ſaws off the jets with which it appears covered over, and repairs it with chiſſels, gravers, puncheons, &c.

Foundery *of Bells*. The metal, it is to be obſerved, is different for bells, from what it is for ſtatues; there being no tin in the ſtatue-metal: but there is a fifth, and ſometimes more, in the bell-metal.

The dimenſions of the core and the wax for bells, if a ring of bells eſpecially, are not left to chance, but muſt be meaſured on a ſcale, or diapaſon, which gives the height, aperture, and thickneſs, neceſſary for the ſeveral tones required.

It is on the wax that the ſeveral mouldings and other ornaments are formed to be repreſented in relievo, on the outſide of the bell.

The buſineſs of bell-foundery is reducible to three particulars. 1. The proportion of a bell. 2. The forming of the mould; and, 3. The melting of the metal.

The proportions of our bells differ much from thoſe of the Chineſe: in ours, the modern proportions are, to make the diameter fifteen times the thickneſs of the brim, and twelve times the height.

There are two kinds of preparations, viz. the ſimple and the relative: the former are thoſe proportions only that are between the ſeveral parts of a bell, to render it ſonorous; the relative proportions eſtabliſh a requiſite harmony between ſeveral bells.

The particulars neceſſary for making the mould of a bell are, 1. The earth: the moſt coheſive is the beſt; it muſt be well ground and ſifted, to prevent any chinks. 2. Brick-ſtone; which muſt be uſed for the mine, mould, or core, and for the furnace. 3. Horſe-dung, hair, and hemp, mixed with the earth, to render the cement more binding. 4. The wax for inſcriptions, coats of arms, &c. 5. The tallow equally mixed with the wax, in order to put a ſlight lay of it upon the outer mould, before any letters are applied to it. 6. The coals to dry the mould.

For making the mould, they have a ſcaffold conſiſting of four boards, ranged upon treſſels. Upon this they carry the earth, groſsly diluted, to mix it with horſe-dung, beating the whole with a large ſpatula.

The compaſſes of conſtruction is the chief inſtrument for making the mould, which conſiſt of two different legs joined by a third piece. And laſt of all, the founders ſhelves, on which are the engravings of the letters, cartridges, coats of arms, &c.

They firſt dig a hole of a ſufficient depth to contain the mould of the bell, together with the caſe, or cannon, under ground; and about ſix inches lower than the terreplain, where the work is performed. The hole muſt be wide enough for a free paſſage between the mould and walls of the hole, or between one mould and another, when ſeveral bells are to be caſt. At the centre of the hole is a ſtake erected, that is ſtrongly faſtened in the ground. This ſupports an iron peg, on which the pivot of the ſecond branch of the compaſſes turns. The ſtake is encompaſſed with a ſolid brick-work, perfectly round, about half a foot high, and of the propoſed bell's diameter. This they call a *mill-ſtone*. The parts of the mould are, the core, the model of the bell, and the ſhell. When the outer ſurface of the core is formed, they begin to raiſe the core, which is made of bricks that are laid in courſes of equal height upon a lay of plain earth. At the laying of each brick, they bring near it the branch of the compaſſes, on which the curve of the core is ſhaped, ſo as that there may remain between it and the curve the diſtance of a line, to be afterwards filled up with layers of cement. The work is continued to the top, only leaving an opening for the coals to bake the core. This work is covered with a layer of cement, made of earth and horſe-dung; on which they move the compaſſes of conſtruction, to make it of an even ſmoothneſs every where.

The firſt layer being finiſhed, they put the fire to the core, by filling it half with coals, through an opening that is kept ſhut, during the baking, with a cake of earth that has been ſeparately baked. The firſt fire conſumes the ſtake, and the fire is left in the core half or ſometimes a whole day: the firſt layer being thoroughly dry, they cover it with a ſecond, third, and fourth; each being ſmoothed by the board of the compaſſes, and thoroughly dried before they proceed to another.

The core being completed, they take the compaſſes to pieces, with intent to cut off the thickneſs of the model, and the compaſſes are immediately put in their place to begin a ſecond piece of the mould. It conſiſts of a mixture of earth and hair, applied with the hand on the core, in ſeveral cakes that cloſe together. This work is finiſhed by ſeveral layers of a thinner cement of the ſame matter, ſmoothed by the compaſſes, and thoroughly dried before another is laid on. The firſt layer of the model is a mixture of wax and greaſe ſpread over the whole. After which are applied the inſcriptions, coats of arms, &c. beſmeared with a pencil dipped in a veſſel of wax in a chaffing-diſh: this is done for every letter. Before the ſhell is begun, the compaſſes are taken to pieces, to cut off all the wood that fills the place of the thickneſs to be given to the ſhell.

The firſt layer is the ſame earth with the reſt, ſifted very fine; whilſt it is tempering in water, it is mixed with cow's hair, to make it cohere. The whole being a thin cullis, is gently poured on the model, that fills exactly all the ſinuoſities of the figures, &c. and this is repeated till the whole is two lines thick over the model. When this layer is thoroughly dried, they cover it with a ſecond of the ſame matter, but ſomewhat thicker: when this ſecond layer becomes of ſome conſiſtence, they apply the compaſſes again, and light a fire in the core, ſo as to melt off the wax of the inſcriptions, &c.

After this, they go on with other layers of the ſhell, by means of the compaſſes. Here they add to the cow's hair a quantity of hemp, ſpread upon the layers, and afterwards ſmoothed by the board of the compaſſes. The thickneſs of the ſhell comes to four or five inches lower than the mill-ſtone before obſerved, and ſurrounds it quite cloſe, which prevents the extravaſation of the metal. The wax ſhould be taken out before the melting of the metal.

The ear of the bell requires a ſeparate work, which is done during the drying of the ſeveral incruſtations of the cement. It has ſeven rings; the ſeventh is called the *bridge*, and unites the others, being a perpendicular ſupport to ſtrengthen the curves. It has an aperture at the top, to admit a large iron peg, bent at the bottom; and this is introduced into two holes in the beam, faſtened with two ſtrong iron keys. There are models made of the rings, with maſſes of beaten earth, that are dried in the fire, in order to have the hollow of them. Theſe rings are gently preſſed upon a layer of earth and cow's hair, one half of its depth; and then taken out, without breaking the mould. This operation is repeated 12 times for 12 half-moulds, that two and two united may make the hollows of the ſix rings: the ſame they do for the hollow of the bridge, and bake them all, to unite them together.

Upon the open place left for the coals to be put in, are placed the rings that conſtitute the ear. They firſt put into this open place the iron-ring to ſupport the clapper of the bell; then they make a round cake of clay, to fill up the diameter of the thickneſs of the core. This cake, after baking, is clapped upon the opening, and ſoldered with a thin mortar ſpread over it, which binds the cover cloſe to the core.

The hollow of the model is filled with an earth, ſufficiently moiſt to fix on the place, which is ſtrewed at ſeveral times upon the cover of the core; and they beat it gently with a peſtle, to a proper height; and a workman ſmooths the earth at top with a wooden trowel dipped in water.

Upon this cover, to be taken off afterwards, they aſſemble the hollows of the rings. When every thing is in its proper place, they ſtrengthen the outſide of the hollows with mortar, in order to bind them with the bridge, and keep them ſteady at the bottom, by means of a cake of the ſame mortar, which fills up the whole aperture of the ſhell. This they let dry, that it may be removed without breaking. To make room for the metal, they pull off the hollows of the rings, through which the metal is to paſs, before it enters into the vacuity of the mould. The ſhell being unloaded of its ear, they range under the millſtone five or ſix pieces of wood, about two feet long, and thick enough to reach almoſt the lower part of the ſhell; between theſe and the mould, they drive in wooden wedges with a mallet, to ſhake the ſhell of the model whereon it reſts, ſo as to be pulled up and got out of the pit.

When this and the wax are removed, they break the model and the layer of earth, through which the metal muſt run, from the hollow of the rings, between the ſhell and the core. They ſmoke the inſide of the ſhell, by burning ſtraw under it, that helps to ſmooth the ſurface of the bell. Then they put the ſhell in the place, ſo as to leave the ſame interval between that and the core; and before the hollows of the rings or the cap are put on again, they add two vents, that are united to the rings, and to each other, by a maſs of baked cement. After which they put on this maſs of the cap, the rings, and the vent, over the ſhell, and ſolder it with thin cement, which is dried gradually by covering it with burning coals. Then they fill up the pit with earth, beating it ſtrongly all the time, round the mould.

The furnace has a place for the fire, and another for the metal. The fire-place has a large chimney with a ſpacious aſh-hole. The furnace which contains the metal, is vaulted, whoſe bottom is made of earth, rammed down; the reſt is built with brick. It has four apertures; the firſt, through which the flame revibrates; the ſecond is cloſed with a ſtopple that is opened for the metal to run; the others are to ſeparate the droſs, or ſcoriæ, of the metal by wooden rakes: through theſe laſt apertures paſſes the thick ſmoke. The ground of the furnace is built ſloping, for the metal to run down.

FOUNDERY *of Great Guns and Mortar-Pieces.* The method of caſting theſe pieces is little different from that of bells: they are run maſſy, without any core, being determined by the hollow of the ſhell; and they are afterwards bored with a ſteel trepan, that is worked either by horſes or a water-mill.

For the metal, parts, proportions, &c. of theſe pieces, ſee GUNNERY.

Letter-FOUNDERY, or *Caſting of Printing-Letters.* The firſt thing requiſite is to prepare good ſteel-punches, on the face of which is drawn the exact ſhape of the letter with pen and ink, if the letter be large, or with a ſmooth blunted point of a needle, if ſmall; and then, with proper gravers, the cutter digs deep between the ſtrokes, letting the marks ſtand on the punch; the work of hollowing being generally regulated by the depth of the counter-punch: then he fills the outſide, till it is fit for the matrice.

They have a mould to juſtify the matrices by, which conſiſts of an upper and under part, both which are alike, except the ſtool and ſpring behind, and a ſmall roundiſh wire in the upper part, for making the nick in the ſhank of the letter. Theſe two parts are exactly fitted into each other, being a male and female gage, to ſlide backwards and forwards.

Then they juſtify the mould, by caſting about 20 ſamples of letters, which are ſet in a compoſing-ſtick, with the nicks towards the right hand; and comparing theſe every way with the pattern-letters ſet up in the ſame manner, they find the exact meaſure of the body to be caſt.

Next they prepare the matrix, which is of braſs or copper, an inch and a half long, and of a proportionable thickneſs to the ſize of the letter it is to contain. In this metal is ſunk the face of the letter, by ſtriking the letter-punch the depth of an *n*. After this, the ſides and face of the matrice are juſtified, and cleared, with files, of all bunchings that have been made by ſinking the punch.

Then it is brought to the furnace, which is built upright of brick with four ſquare ſides, and a ſtone at top, in which is a hole for the pan to ſtand in.

Printing-letters are made of lead, hardened with iron or ſtub-nails. To make the iron run, they mingle an equal weight of antimony, beaten ſmall in an iron mortar, and ſtub-nails together. They charge a proper number of earthen-pots, that bear the fire, with the two ingredients, as full as they can hold; and melt it in an open furnace, built for that purpoſe.

When it bubbles, the iron is then melted, but it evaporates very much. This melted compoſt is ladled into an iron-pot, wherein is melted lead, that is fixed on a furnace cloſe to the former, 3 ℔ of melted iron to 25 ℔ of lead; this they incorporate according to art.

The caſter taking the pan off the ſtone, and having kindled a good fire, he ſets the pan in again, and metal in it to melt. If it be a ſmall-bodied letter, or a thin letter with great bodies, that he intends to caſt, his metal muſt be very hot, and ſometimes red-hot, to make the letter come. Then taking a ladle, of which he has ſeveral ſorts, that will hold as much as will make the letter and break, he lays it at the hole where the flame burſts out: then he ties a thin leather, cut with its narrow end againſt the face, to the leather groove of the matrice, by whipping a brown thread twice about the leather groove, and faſtening the thread with a knot. Then he puts both pieces of the mould together, and the matrice into the matrice-cheek; and places the foot of the matrice on the ſtool of the mould, and the broad end of the leather on the wood of the upper haft of the mould, but not tight up, leſt it hinder the foot of the matrice from ſinking cloſe down upon the ſtool, in a train of work. Afterwards laying a little roſin on the upper part of the mould, and having his caſting-ladle hot, he, with the boiling ſide, melts the roſin, and preſſes the broad end of the leather hard down on the wood, and ſo faſtens it thereto. Now he comes to caſting; when placing the under half of the mould in his left hand, with the hook or jag forward, he holds the ends of its wood between the lower part of the ball of his thumb and his three hinder fingers: then he lays the upper half of the mould upon the under half, ſo as the male gages may fall into the female, and at the ſame time the foot of the matrice places itſelf upon the ſtool; and claſping his left-hand thumb ſtrongly over the upper half, he nimbly catches hold of the bow or ſpring, with his right-hand fingers at the top of it, and his thumb under it, and places the point of it againſt the middle of the notch in the backſide of the matrice, preſſing it forwards as well towards the mould, as downwards, by the ſhoulder of the notch, cloſe upon the ſtool, while, at the ſame time, with his hinder fingers, as aforeſaid, he draws the under half of the mould towards the ball of his thumb, and thruſts, by the ball of his thumb, the upper part towards his fingers, that both the regiſters of the mould may preſs againſt both ſides of the matrice, and his thumb and fingers preſs both ſides of the mould cloſe together.

Then he takes the handle of his ladle in his right hand, and with the ball of it gives two or three ſtrokes outwards upon the ſurface of the melted metal, to clear it of the ſcum; then he takes up the ladle full, and having the mould in his left hand, turns his left ſide a little from the furnace, and brings the geat of his ladle to the mouth of his mould; and turns the upper part of his right hand towards him, to pour the metal into it, while, at the ſame inſtant, he puts the mould in his left hand forwards, to receive the metal with a ſtrong ſhake, not only into the bodies of the mould, but, while the metal is yet hot, into the very face of the matrice, to receive its perfect form there as well as in the ſhank. Then he takes the upper half of the mould off, by placing his right thumb on the end of the wood next his left thumb, and his two middle fingers at the other end of the wood: he toſſes the letter, break and all, out upon a ſheet of waſte paper, laid on a bench, a little beyond his left hand; and then is ready to caſt another letter, as before, and likewiſe the whole number in that matrix.

Then boys, commonly employed for this purpoſe, ſeparate the breaks from the ſhanks, and rub them on a ſtone, and afterwards a man cuts them all of an even height, which finiſhes the fount for the uſe of the printer. See the next article.

A workman will ordinarily caſt 3000 of theſe letters in a day. The perfection of letters thus caſt, conſiſts in their being all ſeverally ſquare and ſtraight on every ſide; and all generally of the ſame height, and evenly lined, without ſtooping one way or other; neither too big in the foot, nor the head; well grooved, ſo as the two extremes of the foot contain half the body of the letter; and well ground, barbed, and ſcrapped, with a ſenſible notch, &c. See PRINTING.

FOUNT, or FONT, among printers, a ſet or quantity of letters, and all the appendages belonging thereto; as numeral characters, quadrates, points, &c. caſt by a letter-founder, and ſorted.

FOUNTAIN, in philoſophy, a ſpring or ſource of water riſing out of the earth. Among the ancients, fountains were held ſacred, and even worſhipped as a kind of divinities. For the phenomena, theory, and origin of fountains or ſprings, ſee SPRING.

Artificial FOUNTAIN, called alſo a *jet d'eau*, is a contrivance by which water is violently ſpouted upwards. See HYDRAULICS.

FOUNTAIN-*Tree*, a very extraordinary vegetable growing in one of the Canary iſlands, and likewiſe ſaid to exiſt in ſome other places, which diſtils water from its leaves in ſuch plenty as to anſwer all the purpoſes of the inhabitants who live near it. Of this tree we have the following account in Glaſſe's hiſtory of the Canary Iſlands.—"There are only three fountains of water in the whole iſland of Hierro, wherein the fountain-tree grows. One of theſe fountains is called *Acoſ*, which, in the language of the ancient inhabitants, ſignifies river; a name, however, which does not ſeem to have been given it on account of its yielding much water, for in that reſpect it hardly deſerves the name of a fountain. More to the northward is another called *Hapio*; and in the middle of the iſland is a ſpring, yielding a ſtream about the thickneſs of a man's finger. This laſt was diſcovered in the year 1565, and is called the *fountain of Anton. Hernandez*. On account of the ſcarcity of water, the ſheep, goats, and ſwine, here do not drink in the ſummer, but are taught to dig up the roots of fern, and chew them to quench their thirſt. The great cattle are watered at thoſe fountains, and at a place where water diſtils from the leaves of a tree. Many writers have made mention of this famous tree, ſome in ſuch a manner as to make it appear miraculous: others again deny the exiſtence of any ſuch tree; among whom is Father Feyjoo, a modern Spaniſh author, in his Theatro Critico. But he, and thoſe who agree with him in this matter, are as much miſtaken as thoſe who would make it appear to be miraculous. This is the only iſland of all the Canaries which I have not been in; but I have ſailed with natives of Hierro, who, when queſtioned about the exiſtence of this tree, anſwered in the affirmative.

"The author of the *Hiſtory of the diſcovery and conqueſt* has given us a particular account of it, which I ſhall here relate at large.

'The diſtrict in which this tree ſtands is called *Tigulahe*; near to which, and in the cliff, or ſteep rocky aſcent that ſurrounds the whole iſland, is a narrow gutter or gulley, which commences at the ſea, and continues to the ſummit of the cliff, where it joins or coincides with a valley, which is terminated by the ſteep front of a rock. On the top of this rock grows a tree, called in the language of the ancient inhabitants, *Garſe*, "Sacred or Holy Tree," which for many years has been preſerved ſound, entire, and freſh. Its leaves conſtantly diſtil ſuch a quantity of water as is ſufficient to furniſh drink to every living creature in Hierro; nature having provided this remedy for the drought of the iſland. It is ſituated about a league and a half from the ſea. Nobody knows of what ſpecies it is, only that it is called *Til*. It is diſtinct from other trees, and ſtands by itſelf; the circumference of the trunk is about 12 ſpans, the diameter four, and in height from the ground to the top of the higheſt branch, 40 ſpans: the circumference of all the branches together is 120 feet. The branches are thick and extended; the loweſt commence about the height of an ell from the ground. Its fruit reſembles the acorn, and taſtes ſomething like the kernel of a pine-apple, but is ſofter and more aromatic. The leaves of this tree reſemble thoſe of the laurel, but are larger, wider, and more curved; they come forth in a perpetual ſucceſſion, ſo that the tree always remains green. Near to it grows a thorn which faſtens on many of its branches, and interweaves with them; and at a ſmall diſtance from the garſe are ſome beech-trees, breſos, and thorns. On the north ſide of the trunk are two large tanks or ciſterns, of rough ſtone, or rather one ciſtern divided, each half being 20 feet ſquare, and 16 ſpans in depth. One of theſe contains water for the drinking of the inhabitants; and the other that which they uſe for their cattle, waſhing, and ſuch-like purpoſes. Every morning, near this part of the iſland, a cloud or miſt ariſes from the ſea, which the ſouth and eaſterly winds force againſt the fore-mentioned ſteep cliff; ſo that the cloud having no vent but by the gutter, gradually aſcends it, and from thence advances ſlowly to the extremity of the valley, where it is ſtopped and checked by the front of the rock which terminates the valley, and then reſts upon the thick leaves and wide-ſpreading branches of the tree, from whence it diſtils in drops during the remainder of the day, until it is at length exhauſted, in the ſame manner that we ſee water drip from the leaves of trees after a heavy ſhower of rain. This diſtillation is not peculiar to the garſe, or til; for the breſos, which grow near it, likewiſe drop water; but their leaves being but few and narrow, the quantity is ſo trifling, that though the natives ſave ſome of it, yet they make little or no account of any but what diſtils from the til, which, together with the water of ſome fountains, and what is ſaved in the winter ſeaſon, is ſufficient to ſerve them and their flocks. This tree yields moſt water in thoſe years when the Levant or eaſterly winds have prevailed for a continuance; for, by theſe winds only the clouds or miſts are drawn hither from the ſea. A perſon lives on the ſpot near which this tree grows, who is appointed by the council to take care of it and its water; and is allowed a houſe to live in, with a certain ſalary. He every day diſtributes to each family of the diſtrict ſeven pots or veſſels full of water, beſides what he gives to the principal people of the iſland.'

"Whether the tree which yields water at this preſent time be the ſame as that mentioned in the above deſcription, I cannot pretend to determine: but it is probable there has been a ſucceſſion of them; for Pliny, deſcribing the Fortunate iſland, ſays, 'In the mountains of Ombrion are trees reſembling the plant ferula, from which water may be procured by preſſure. What comes from the black kind is bitter, but that which the white yields is ſweet and potable."

Trees yielding water are not peculiar to the iſland of Hierro; for travellers informs us of one of the ſame kind on the iſland of St Thomas, in the bight or gulph of Guiney. In Cockburn's voyages we find the following account of a dropping tree, near the mountains of Fera Paz, in America.

'On the morning of the fourth day, we came out on a large plain, where were great numbers of fine deer, and in the middle ſtood a tree of unuſual ſize, ſpreading its branches over a vaſt compaſs of ground. Curioſity led us up to it. We had perceived, at ſome diſtance off, the ground about it to be wet; at which we began to be ſomewhat ſurpriſed, as well knowing there had no rain fallen for near ſix months paſt, according to the certain courſe of the ſeaſon in that latitude: that it was impoſſible to be occaſioned by the fall of dew on the tree, we were convinced, by the ſun's having power to exhale away all moiſture of that nature a few minutes after its riſing. At laſt, to our great amazement as well as joy, we ſaw water dropping, or as it were diſtilling, faſt from the end of every leaf of this wonderful (nor had it been amiſs if I had ſaid *miraculous*) tree; at leaſt it was ſo with reſpect to us, who had been labouring four days through extreme heat, without receiving the leaſt moiſture, and were now almoſt expiring for the want of it.

'We could not help looking on this as liquor ſent from heaven to comfort us under great extremity. We catched what we could of it in our hands, and drank very plentifully of it; and liked it ſo well, that we could hardly prevail with ourſelves to give over. A matter of this nature could not but incite us to make the ſtricteſt obſervations concerning it; and accordingly we ſtaid under the tree near three hours, and found we could not fathom its body in five times. We obſerved the ſoil where it grew to be very ſtrong; and upon the niceſt inquiry we could afterwards make, both of the natives of the country and the Spaniſh inhabitants, we could not learn there was any ſuch tree known throughout New Spain, nor perhaps all America over; but I do not relate this as a prodigy in nature, becauſe I am not philoſopher enough to aſcribe any natural cauſe for it: the learned may perhaps give ſubſtantial reaſons in nature for what appeared to us a great and marvellous ſecret.'

FOUQUIERE (James), an excellent Flemiſh painter of landſcapes, born at Anvers. De Piles ſays, the difference between his pictures and thoſe of Titian conſiſt rather in the countries repreſented, than in the goodneſs of the pieces; the principles of both are the ſame, and the colouring alike good and regular. He painted for Rubens, of whom he learned the moſt eſſential part of his art. The elector Palatine employed him at Heidelberg; and thence going to Paris, he painted the Louvre, under the reign of Lewis XIII. and acquired great reputation by his pictures. He died at Paris, in 1659.

FOURCHEE, or FOURCHY, in heraldry, an appellation given to a croſs forked at the ends. See HERALDRY.

FOURMONT (Stephen), profeſſor of the Arabic and Chineſe languages, and one of the moſt learned men of his time, was born Herbelai, a village four leagues from Paris, in 1683. He ſtudied in Mazarine college, and afterwards in the Seminary of Thirty-three. He was at length profeſſor of Arabic in the Royal college, and was made a member of the Academy of Inſcriptions. In 1738, he was choſen a member of the Royal Society in London, and of that of Berlin in 1741. He was often conſulted by the duke of Orleans, firſt prince of the blood; who had a particular eſteem for him, and made him one of his ſecretaries. He wrote a great number of books; the moſt conſiderable of thoſe which have been printed are, 1. The roots of the Latin tongue, in verſe. 2. Critical reflections on the hiſtories of ancient nations, two volumes, quarto. 4. A Chineſe grammar, in Latin, folio. 5. Several diſſertations printed in the Memoirs of the Academy of Inſcriptions, &c. He died at Paris, in 1745.

He ought not to be confounded with Michael Fourmont, his youngeſt brother; who took orders, was profeſſor of the Syriac language in the Royal college, and a member of the Academy of Inſcriptions. He died in 1746.

FOURTH REDUNDANT, in muſic. See INTERVAL.

FOWEY, or FOY, a town of Cornwall in England. It is ſeated on an aſcent, is fortified, and its haven well ſecured with blockhouſes. It is a good trading place, and its market well ſupplied with corn. It ſends two members to parliament. W. Long. 5°. N. Lat 50. 27.

FOWL, among zoologiſts, denotes the larger ſorts of birds, whether domeſtic or wild: ſuch as geeſe, pheaſants, partridges, turkey, ducks, &c.

Tame fowl make a neceſſary part of the ſtock of a country farm. See the article POULTRY.

Fowls are again diſtinguiſhed into two kinds, viz. *land* and *water* fowl, theſe laſt being ſo called from their living much in and about water: alſo into thoſe which are accounted *game*, and thoſe which are not. See the article GAME.

FOWLING, the art of catching birds by means of bird-lime, decoys, and other devices, or the killing of them by the gun. See BIRD-*Catching*, BIRD-*Lime*, De-

Decoy, Shooting, and the names of the different birds in the order of the alphabet.

Fowling, is alſo uſed for the purſuing and taking birds with hawks, more properly called falconry or hawking. See theſe articles.

Fowling-*Piece*, a light gun for ſhooting birds. That piece is always reckoned beſt which has the longeſt barrel, from $5\frac{1}{2}$ to 6 feet, with a moderate bore; though every fowler ſhould have them of different ſizes, ſuitable to the game he deſigns to kill. The barrel ſhould be well poliſhed and ſmooth within, and the bore of an equal bigneſs from one end to the other; which may be proved, by putting in a piece of paſteboard, cut of the exact roundneſs of the top: for if this goes down without ſtops or ſlipping, you may conclude the bore good. The bridge-pan muſt be ſomewhat above the touch-hole, and ought to have a notch to let down a little powder: this will prevent the piece from recoiling, which it would otherwiſe be apt to do. As to the locks, chooſe ſuch as are well filed with true work, whoſe ſprings muſt be neither too ſtrong nor too weak. The hammer ought to be well hardened, and pliable to go down to the pan with a quick motion.

FOX, in zoology. See Canis.

The fox is a great nuiſance to the huſbandman, by taking away and deſtroying his lambs, geeſe, poultry, &c. The common way to catch him is by gins; which being baited, and a train made by drawing raw fleſh acroſs in his uſual paths or haunts to the gin, it proves an inducement to bring him to the place of deſtruction.

The fox is alſo a beaſt of chace, and is taken with gre-hounds, tarriers, &c. See the article Hunting.

Fox (John), the martyrologiſt, was born at Boſton in Lincolnſhire, in the year 1517. At the age of 16 he was entered a ſtudent of Brazen-noſe college in Oxford: and in 1543, he proceeded maſter of arts, and was choſen fellow of Magdalen college. He diſcovered an early genius for poetry, and wrote ſeveral Latin comedies, the ſubjects taken from ſcripture, which his ſon aſſures us were written in an elegant ſtyle. Forſaking the muſes, he now applied himſelf with uncommon aſſiduity to the ſtudy of divinity, particularly church-hiſtory; and, diſcovering a premature propenſity to the doctrine of reformation, he was expelled the college as an heretic. His diſtreſs on this occaſion was very great; but it was not long before he found an aſylum in the houſe of Sir Thomas Lucy, of Warwickſhire, who employed him as a tutor to his children. Here he married the daughter of a citizen of Coventry. Sir Thomas's children being now grown up, after reſiding a ſhort time with his wife's father, he came to London; where finding no immediate means of ſubſiſtence, he was reduced to the utmoſt degree of want; but was at length, (as his ſon relates) miraculouſly relieved, in the following manner: As he was one day ſitting in St Paul's church, emaciated with hunger, a ſtranger accoſted him familiarly, and, bidding him be of good cheer, put a ſum of money into his hand; telling him at the ſame time, that in a few days new hopes were at hand. He was ſoon after taken into the family of the ducheſs of Richmond, as tutor to the earl of Surrey's children, who, when their father was ſent to the tower, were committed to her care. In this family he lived, at Ryegate in Surrey, during the latter part of the reign of Henry VIII. the entire reign of Edward VI. and part of that of queen Mary: but at length, perſecuted by his implacable enemy biſhop Gardiner, he was obliged to ſeek refuge abroad. Baſil in Switzerland was the place of his retreat, where he ſubſiſted by correcting the preſs. On the death of queen Mary, he returned to England; where he was graciouſly received by his former pupil the duke of Norfolk, who retained him in his family as long as he lived, and bequeathed him a penſion at his death. Mr ſecretary Cecil alſo obtained for him the rectory of Shipton, near Saliſbury; and we are aſſured that he might have had conſiderable church-preferment, had it not been for his unwillingneſs to ſubſcribe to the canons. He died in the year 1587, in the 70th year of his age; and was buried in the chancel of St Giles's, Cripplegate. He was a man of great induſtry, and conſiderable learning; a zealous, but not a violent reformer; a nonconformiſt, but not an enemy to the church of England. He left two ſons; one of which was bred a divine, the other a phyſician. He wrote many pieces: but his principal work is the *Acts and monuments of the church*, &c. commonly called *Fox's Book of Martyrs*. His facts are not always to be depended on, and he often loſes his temper; which, conſidering the ſubject, is not much to be wondered at.

Fox (George), the founder of the ſect of Engliſh Quakers, was a ſhoemaker in Nottingham. The accounts of thoſe times tells us, that as he wrought at his trade, he uſed to meditate much on the ſcriptures: which, with his ſolitary courſe of life, improving his natural melancholy, he began at length to fancy himſelf inſpired; and in conſequence thereof ſet up for a preacher.

He propoſed but few articles of faith; inſiſting chiefly on moral virtue, mutual charity, the love of God, and a deep attention to the inward motions and ſecret operations of the ſpirit: he required a plain ſimple worſhip, and a religion without ceremonies, making it a principal point to wait in profound ſilence the directions of the Holy Spirit. Fox met with much rough treatment for his zeal, was often impriſoned, and ſeveral times in danger of being knocked on the head. But all diſcouragements notwithſtanding, his ſect prevailed much, and many conſiderable men were drawn over to them; among whom were Barclay and Penn. He died in 1681. His followers were called *Quakers*, in deriſion of ſome unuſual ſhakings and convulſions with which they were ſeized at their firſt meetings. See the article Quakers.

Fox-*Glove*, in botany. See Digitalis.

FRACASTOR (Jerome), a moſt eminent Italian poet and phyſician, was born at Verona in the year 1482. Two ſingularities are related of him in his infancy: one is, that his lips adhered ſo cloſely to each other, when he came into the world, that a chirurgeon was obliged to divide them with his inciſion-knife; the other, that his mother was killed with lightning, while he, though in her arms at the very moment, eſcaped unhurt. Fracaſtor was of parts ſo exquiſite, and made ſo wonderful a progreſs in every thing he undertook, that he became eminently ſkilled, not only in the belles lettres, but in all arts and ſciences. He was a poet, a philoſopher, a phyſician, an aſtronomer, a mathematician, and what not? He was a man of vaſt conſequence in his time; as appears from pope Paul III.'s making uſe of his authority to remove the council of Trent to Bologne, under the pretext of a contagious diſtemper, which, as Fracaſtor depoſed, made it no longer ſafe to continue at Trent. He was intimately acquainted with cardinal Bembus, Julius Scaliger, and all the great men of his time. He died of an apoplexy at Caſi near Verona, in 1553: and in 1559, the town of Verona erected a ſtatue in honour of him.

He was the author of many performances, both as a poet and as a phyſician; yet never man was more diſintereſted in both theſe capacities than he. Evidently ſo as a phyſician, for he practiſed without fees; and as a poet, whoſe uſual reward is glory, nothing could be more indifferent. It is owing to this indifference, that we have ſo little of his poetry, in compariſon of what he wrote; and that, among other compoſitions, his Odes and Epigrams, which were read in manuſcript with infinite admiration, yet, never paſſing the preſs, were loſt. What we have now of his, are the three books of "Siphilis, or of the French diſeaſe;" a book of Miſcellaneous Poems; and two books of his poem intitled *Joſeph*, which he began at the latter end of his life, but did not live to finiſh. And theſe works, it is ſaid, would have periſhed with the reſt, if his friends had not taken care to preſerve and communicate copies of them: for Fracaſtor, writing merely for amuſement, never troubled himſelf in the leaſt about what became of his works after they once got out of his hands. Fracaſtor compoſed alſo a poem, called *Alcon, ſive de cura canum venaticorum.* His poems, as well as his other works, are written all in Latin. His medical pieces are, *De Sympathia & Antipathia,—De contagione & contagioſis morbis,—De cauſis criticorum dierum,—De vini temperatura*, &c. His works have been printed ſeparately and collectively. The beſt edition of them is that of Padua 1735, in 2 vols 4to.

FRACHES, in glaſs-making, flat iron-pans, wherein the new-made veſſels are put, to be removed gradually from the fire. See the article GLASS.

FRACTION, in arithmetic. See ARITHMETIC, n° 21. 26.

FRACTURE, in ſurgery, a rupture of a bone, or a ſolution of continuity in a bone when it is cruſhed or broken by ſome external cauſe. See SURGERY.

FRÆNUM, in anatomy, a term applied to ſome membranous ligaments of the body; as,

FRÆNUM *Linguæ*. See ANATOMY, n° 403, d.

FRÆNUM *Penis*. See ANATOMY, n° 381, r.

FRAGA, a ſtrong town with a handſome caſtle in the kingdom of Arragon in Spain. It is ſtrong by ſituation among the mountains; having the river Cinca before it, whoſe high banks are difficult of acceſs; and at its back a hill, which cannot eaſily be approached with large cannon. Alphonſo VII. king of Arragon, and the firſt of that name of Caſtile, was killed by the Moors in 1134, when he beſieged this town. E. Long. 0. 23. N. Lat. 41. 28.

FRAGARIA, the STRAWBERRY; a genus of the polygynia order, belonging to the icoſandria claſs of plants. There is but one ſpecies, viz. the veſca, or cultivated ſtrawberry. The principal varieties are, 1. The ſylveſtris, or wood-ſtrawberry, with oval ſawed leaves, and ſmall round fruit. 2. The Virginian ſcarlet, or Virginia ſtrawberry, with oblong oval ſawed leaves, and a roundiſh ſcarlet-coloured fruit. 3. The moſchata, or hautboy, or muſky ſtrawberry, having oval, lanceolate, rough leaves, and large pale-red fruit. 4. The Chiloenſis, or Chili ſtrawberry, with large, oval, thick, hairy leaves, large flowers, and very large, firm fruit. 5. The Alpina, Alpine, or monthly ſtrawberry, having ſmall oval leaves, ſmall flowers, and moderate ſized, oblong, pointed fruit.

All theſe varieties are hardy, low, perennials, durable in root, but the leaves and fruit-ſtalks are renewed annually in ſpring. They flower in May and June, and their fruit comes to perfection in June, July, and Auguſt; the Alpine kind continuing till the beginning of winter. They all proſper in any common garden ſoil, producing abundant crops annually without much trouble. They increaſe exceedingly every ſummer, both by off-ſets or ſuckers from the ſides of the plants, and by the runners or ſtrings, all of which rooting and forming plants at every joint, each of which ſeparately planted bears a few fruit the following year, and bear in great perfection the ſecond ſummer. Thoſe of the Alpine kind will even bear fruit the ſame year that they are formed. All the ſorts are commonly cultivated in kitchen-gardens, in beds or borders of common earth, in rows lengthwiſe 15 or 18 inches diſtance; the plants the ſame diſtance from one another in each row. Patches of the different ſorts diſpoſed here and there in the fronts of the different compartments of the pleaſure ground, will appear ornamental both in their flowers and fruit, and make an agreeable variety.

Strawberries, eaten either alone, or with ſugar and milk, are univerſally eſteemed a moſt delicious fruit. They are grateful, cooling, ſubacid, and juicy. Tho' taken in large quantities, they ſeldom diſagree. They promote perſpiration, impart a violet ſmell to the urine, and diſſolve the tartareous incruſtations on the teeth. People afflicted with the gout or ſtone have found relief by uſing them very largely; and Hoffman ſays, he has known conſumptive people cured by them. The bark of the root is aſtringent.—Sheep and goats eat the plant; cows are not fond of it; horſes and ſwine refuſe it.

FRAGUIER (Claude Francis), a polite and learned French writer, born at Paris, of a noble family, in 1666. He was educated under the Jeſuits, and was even admitted into the order, though he afterwards quitted it; and being thus at liberty to follow his inclinations, he ſoon after aſſiſted the Abbè Bignon in conducting the *Journal de Scavans*, having all the qualifications for ſuch a work. His works conſiſt of Latin poems, and a great number of very excellent diſſertations. He died in 1728.

FRAIL, a baſket made of ruſhes, or the like, in which are packed up figs, raiſins, &c. It ſignifies alſo a certain quantity of raiſins, about 75 pounds.

FRAISE, in fortification, a kind of defence, conſiſting of pointed ſtakes, ſix or ſeven feet long, driven parallel to the horizon into the retrenchments of a camp, a half-moon, or the like, to prevent any approach or ſcalade.

Fraiſes differ from paliſades chiefly in this, that the latter ſtand perpendicular to the horizon, and the former jet out parallel to the horizon, or nearly ſo, being uſually made a little ſloping, or with the points hanging down. Fraiſes are chiefly uſed in retrenchments and other works thrown up of earth; ſometimes they are found under the parapet of a rampart, ſerving inſtead of the cordon of ſtone uſed in ſtone-works.

To Fraise *a Battalion*, is to line the muſqueteers round with pikes, that, in caſe they ſhould be charged with a body of a horſe, the pikes being preſented, may cover the muſqueteers from the ſhock, and ſerve as a barricade.

FRAME, in joinery, a kind of caſe, wherein a thing is ſet or incloſed, or even ſupported; as a window-frame, a picture-frame, &c.

Frame is alſo a machine uſed in divers arts; as,

Frame, among printers, is the ſtand which ſupports the caſes. See Case.

Frame, among founders, a kind of ledge incloſing a board; which, being filled with wetted ſand, ſerves as a mould to caſt their works in. See Foundery.

Frame is more particularly uſed for a ſort of loom, whereon artificers ſtretch their linens, ſilks, ſtuffs, &c. to be embroidered, quilted, or the like.

Frame, among painters, a kind of ſquare, conſiſting of four long ſlips of wood joined together, whoſe intermediate ſpace is divided by threads into ſeveral little ſquares like a net; and hence ſometimes called *reticula*. It ſerves to reduce figures from great to ſmall; or, on the contrary, to augment their ſize from ſmall to great.

FRANCE, a large kingdom of Europe, ſituated between 5° W. and 7° E. Long. and between 43° and 51° N. Lat. being bounded by the Engliſh channel and the Auſtrian Netherlands, on the north; by Germany, Switzerland, Savoy, and Piedmont, in Italy, on the eaſt; by the Mediterranean ſea, and the Pyrenean mountains, which ſeparate it from Spain, on the ſouth; and, by the bay of Biſcay, on the weſt.

1 Firſt ſubdued by Julius Cæſar.

The kingdom of France was originally poſſeſſed by the *Celtes* or *Gauls*. They were a very warlike people, and often checked the progreſs of the Roman arms; nor did they yield till the time of Julius Cæſar, who totally ſubdued their country, and reduced it to the form of a Roman province *. The Romans continued in quiet poſſeſſion of Gaul, as long as their empire retained its ſtrength, and they were in a condition to repreſs the incurſions of the German nations, whom even in the zenith of their power they had not been able to ſubdue. But, in the reign of the emperor Valerian, the ancient Roman valour and diſcipline had begun to decline, and the ſame care was not taken to defend the provinces that had formerly been done. The barbarous nations, therefore, began to make much more frequent incurſions; and among the reſt the *Franks*, a German nation, inhabiting the banks of the Rhine, proved particularly troubleſome. Their firſt irruption, we are told by Valeſius, happened in the year 254, the ſecond of Valerian's reign. At this time they were but few in number; and were repulſed by Aurelian, afterwards emperor. Not diſcouraged by this check, they returned two years afterwards in far greater numbers; but were again defeated by Gallienus, whom Valerian had choſen for his partner in the empire. Others, however, continued to pour in from their native country in ſuch multitudes, that Gallienus, no longer able to drive them out by force of arms, made advantageous propoſals to one of their chiefs, whom he engaged to defend the frontiers againſt his countrymen as well as other invaders.

2 Invaded by the Franks.

This expedient did not long anſwer the purpoſe. In 260 the Franks, taking advantage of the defeat and captivity of Valerian in Perſia, broke into Gaul, and afterwards into Italy, committing every where dreadful ravages. Five years afterwards they invaded Spain; which they poſſeſſed, or rather plundered, for the ſpace of 12 years: nor could they be driven out of Gaul till the year 275, when the emperor Probus not only gave them a total overthrow in that country, but purſued them into their own, where he built ſeveral forts to keep them in awe. This intimidated them ſo much, that nine of their kings ſubmitted to the emperor, and promiſed an annual tribute.—They continued quiet till the year 287; when, in conjunction with the Saxon pirates, they plundered the coaſts of Gaul, carrying off an immenſe booty. To revenge this inſult, the emperor Maximian entered the country of the Franks the following year, where he committed ſuch ravages that two of their kings ſubmitted to him; and to many of the common people who chuſe to remain in Gaul, he allowed lands in the neighbourhood of Treves and Cambray.

The reſtleſs diſpoſition of the Franks, however, did not allow them to remain long in quiet. About the year 293, they made themſelves maſters of Batavia, and part of Flanders; but were entirely defeated and forced to ſurrender at diſcretion, by Conſtantius the father of Conſtantine the Great, who tranſplanted them into Gaul. Their countrymen in Germany continued quiet till the year 306, when they renewed their depredations; but being overcome by Conſtantine the Great, two of their kings were taken priſoners, and thrown to the wild beaſts in the ſhews exhibited on that occaſion.

All theſe victories, however, as well as many others ſaid to have been gained by the Romans, were not ſufficient to prevent the incurſions of this reſtleſs and turbulent nation; inſomuch that, in the year 355, they had made themſelves maſters of 40 cities in the province of Gaul. Soon after, they were totally defeated by the emperor Julian, and again by count Theodoſius father to the emperor of that name; but, in the year 388, they ravaged the province with more fury than ever, and cut off a whole Roman army that was ſent againſt them. As the weſtern empire was at this time in a very low ſtate, they for ſome time found more interruption from other barbarians than from the Romans, till their progreſs was checked by Aetius.

3 Pharamond the firſt king.

When the war with Aetius broke out, the Franks were governed by one *Pharamond*, the firſt of their kings of whom we have any diſtinct account. He is ſuppoſed to have reigned from the year 417 or 418, to the year 428; and is thought by archbiſhop Uſher, to have been killed in the war with Aetius. By ſome he is ſuppoſed to have compiled the Salique Laws, with the aſſiſtance of four ſages named *Wiſegaſt*, *Loſegaſt*, *Widegaſt*, and *Solegaſt*. But Valeſius is of opinion that the Franks had no written laws till the time of Clovis.

4 Clodio.

Pharamond was ſucceeded by his ſon Clodio, who likewiſe carried on a war againſt the Romans. He is ſaid to have received a terrible overthrow from Aetius near the city of Lens; notwithſtanding which, he advanced to Cambray, and made himſelf maſter of that city, where for ſome time he took up his reſidence. After this he extended his conqueſts as far as the river Somme, and deſtroyed the cities of Treves and Cologne, Tournay and Amiens. He died in the year 448, and was ſucceeded by Merovæus.

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* See *Gaul*.

5 Merovæus.

Authors are not agreed whether the new king was brother, or ſon, or any relation at all, to Clodio. It It ſeems probable, indeed, that he was of a different family; as from him the firſt race of French kings were ſtiled *Merovingian*. He was honoured and reſpected by his people, but did not greatly enlarge the boundaries of his kingdom. He died in 458.

6 Childeric.

Merovæus was ſucceeded by his ſon Childeric; who being no longer kept in awe by Aetius, made war on the Romans, and extended his conqueſts as far as the river Loire. He is ſaid to have taken the city of Paris after a ſiege of five years, according to ſome, and of ten, according to others. The Roman power was now totally deſtroyed in Italy; and therefore *Clodovæus*, *Clovis*, or *Louis*, for his name is differently written, who ſucceeded Childeric, ſet himſelf about making an entire conqueſt of Gaul. Part of the province was ſtill retained by a Roman named *Syagrius*, who probably had become ſovereign of the country on the downfall of the Weſtern empire in 476. He was defeated and taken priſoner by Clovis, who afterwards cauſed him to be beheaded, and ſoon after totally reduced his dominions.

7 French monarchy eſtabliſhed by Clovis.

Thus was the French monarchy eſtabliſhed by Clovis in the year 487. He now poſſeſſed all the country lying between the Rhine and the Loire; which, though a very extenſive dominion, was yet conſiderably inferior to what it is at preſent. In 493, he married Clotildis, niece to Gondebaut duke of Burgundy; and embraced the Chriſtian religion. He reduced Armorica, or Brittany; and afterwards made war on the Burgundians, in which he had Theodoric king of the Oſtrogoths for his ally. About this time; however, Alaric king of the Viſigoths inhabiting Auvergne, made war upon Clovis; and a deciſive battle enſuing, the former were entirely defeated, their king killed, and his dominions became a province of France.

Clovis after this deſtroyed all the petty kings or Chriſtians among the Franks, which he did not accompliſh without the vileſt treachery; but by that means his power became abſolute throughout all his dominions. Having removed the ſeat of his government firſt from Tournay to Soiſſons, and then to Paris, he died in 511; and was buried in the church of Sts. Peter and Paul, now Genevieve, where his tomb is ſtill to be ſeen.

8 His dominions divided among his children

After the death of Clovis, his dominions were divided among his four ſons. Thieri, or Theodoric, the eldeſt, had the eaſtern part of the empire; and, from his making the city of Metz his capital, is commonly called the *king of Metz*. Clodomir, the eldeſt ſon by Clotildis, had the kingdom of Orleans; Childebert, and Clotaire, who were both infants, had the kingdoms of Paris and Soiſſons, under the tutelage of their mother. The prudence of Clotildis kept matters quiet in all the parts of the empire for eight years: but, about the year 520, a numerous fleet of Danes arrived at the mouth of the Meuſe; and their king Cochiliac, having landed his forces, began to deſtroy the country with fire and ſword. Againſt him Thieri ſent his ſon Theodobert, who defeated the Daniſh army and navy, and killed their king, forcing the reſt to retire with precipitation.

In 522, Hermanfroi king of Thuringia, having deſtroyed one of his brethren named *Berthaire*, and ſeized on his dominions, applied to Thieri for aſſiſtance againſt his other brother Balderic, whom he intended to treat in the ſame manner. In this infamous enterprize Thieri embarked, on condition that he ſhould have one half of Balderic's dominions; but after the unhappy prince was overcome and killed in battle, Hermanfroi ſeized all his dominions. Thieri had no opportunity of revenging himſelf till the year 531; when perceiving the power of the Oſtrogoths, whom he much dreaded, to be conſiderably leſſened by the death of king Theodoric, he engaged his brother Clotaire to aſſiſt him, and they accordingly entered Thuringia with two powerful armies. They joined their forces as ſoon as they had paſſed the Rhine, and were quickly after reinforced by a conſiderable body of troops under the command of Theodobert. The allies attacked the army of Hermanfroi, which was advantageouſly poſted; and having totally defeated it, he was forced to fly from place to place in diſguiſe. Soon after this the capital was taken, and Hermanfroi himſelf being invited to a conference by Thieri was treacherouſly murdered; after which his extenſive dominions became feudatory to Thieri.

In the mean time, Clotildis had excited her children to make war on the Burgundians, in order to revenge the death of her father Chilperic, whom Gondebaud king of Burgundy had cauſed to be murdered. Gondebaud was now dead, and had left his dominions to his ſons Sigiſmund and Godemar. Sigiſmund's forces were quickly defeated; and he himſelf was ſoon after delivered up by his own ſubjects to Clodomir, who cauſed him to be thrown into a pit, where he periſhed miſerably. By his death Godemar became ſole maſter of Burgundy. Clodomir marched againſt him, and defeated him; but purſuing his victory too eagerly, was ſurrounded by his enemies and ſlain. After the reduction of Thuringia, however, Childebert and Clotaire entered the kingdom of Burgundy at the head of a powerful army, and in 534 compleated the conqueſt of it; in which, according to ſome, Godemar was killed; according to others, he retired into Spain, and from thence into Africa.

9 Clotaire becomes ſole monarch.

In 560 Clotaire became ſole monarch of France. He had murdered the ſons of Clodomir, who was killed in Burgundy as above related. Thieri and his children were dead, as was alſo Childebert; ſo that Clotaire was ſole heir to all the dominions of Clovis. He had five ſons; and the eldeſt of them, named *Chramnes*, had ſome time before rebelled againſt his father in Auvergne. As long as Childebert lived, he ſupported the young prince; but on his death, Chramnes was obliged to implore his father's clemency. He was at this time pardoned; but he ſoon began to cabal afreſh, and engaged the count of Bretagne to aſſiſt him in another rebellion. The Bretons, however, were defeated, and Chramnes determined to make his eſcape; but perceiving that his wife and children were ſurrounded by his father's troops, he attempted to reſcue them. In this attempt he was taken priſoner, and with his family was thruſt into a thatched cottage near the field of battle; of which the king was no ſooner informed, than he commanded the cottage to be ſet on fire, and all that were in it periſhed in the flames.

10 The empire again divided.

Clotaire did not long ſurvive this cruel execution of his ſon, but died in 562; and after his death the French empire was divided among his four remaining ſons, Caribert, Gontran, Sigebert, and Chilperic.—The old king made no diviſion of his dominions before he died, which perhaps cauſed the young princes to fall out ſooner than they would otherwiſe have done. After his death, however, they divided the kingdom by lot; when Caribert, the eldeſt, had the kingdom of Paris; Gontran, the ſecond, had Orleans; Sigebert, had Metz, (or the kingdom of Auſtraſia); and Chilperic had Soiſſons. Provence and Aquitaine were poſſeſſed by all of them in common. The peace of the empire was firſt diſturbed in 563, by an invaſion of the Abares; a barbarous nation, ſaid to be the remains of the Hunns. They entered Thuringia, which belonged to the dominions of Sigebert; but by him they were totally defeated, and obliged to repaſs the Elbe with precipitation. Sigebert purſued them cloſe, but readily concluded a peace with them on their firſt propoſals. To this he was induced, by hearing that his brother Chilperic had invaded his dominions, and taken Rheims and ſome other places in the neighbourhood. Againſt him, therefore, Sigebert marched with his victorious army, made himſelf maſter of Soiſſons his capital, and of the perſon of his eldeſt ſon Theodobert. He then defeated Chilperic in battle; and not only recovered the place which he had ſeized, but conquered the greater part of his dominions: nevertheleſs, on the mediation of the other two brothers, Sigebert abandoned all his conqueſts, ſet Theodobert at liberty, and thus reſtored peace to the empire.

11 Infamous conduct of Chilperic.

Soon after this, Sigebert married Brunehaut daughter to Athanagilde king of the Viſigoths in Spain; and in a little time after the marriage died Caribert king of Paris, whoſe dominions were divided among his three brethren. In 567 Chilperic married Galſwintha, Brunehaut's eldeſt ſiſter, whom he did not obtain without ſome difficulty. Before her arrival, he diſmiſſed his miſtreſs called *Fredegonde*; a woman of great abilities and firmneſs of mind, but ambitious to the higheſt degree, and capable of committing the blackeſt crimes in order to gratify her ambition. The queen, who brought with her immenſe treaſures from Spain, and made it her whole ſtudy to pleaſe the king, was for ſome time entirely acceptable. By degrees, however, Chilperic ſuffered Fredegonde to appear again at court, and was ſuſpected of having renewed his intercourſe with her; which gave ſuch umbrage to the queen, that ſhe deſired leave to return to her own country, promiſing to leave behind her all the wealth ſhe had brought. The king, knowing that this would render him extremely odious, found means to diſſipate his wife's ſuſpicions, and ſoon after cauſed her to be privately ſtrangled, upon which he publicly married Fredegonde.

Such an atrocious action would not fail of exciting the greateſt indignation againſt Chilperic. His dominions were immediately invaded by Sigebert and Gontran, who conquered the greateſt part of them; after which they ſuddenly made peace, Chilperic conſenting that Brunehaut ſhould enjoy thoſe places which on his marriage he had beſtowed upon Galſwintha, viz. Bourdeaux, Limoges, Cahors, Bigorre, and the town of Bearn, now called *Leſcar*.

12 Sigebert aſſaſſinated.

The French princes, however, did not long continue at peace among themſelves. A war quickly enſued, in which Gontran and Chilperic allied themſelves againſt Sigebert. The latter prevailed, and having forced Gontran to a ſeparate peace, ſeemed determined to make Chilperic pay dear for his repeated perfidy and infamous conduct; when he was aſſaſſinated by a contrivance of Fredegonde, who thus ſaved herſelf and Chilperic from the moſt imminent danger. Immediately on his death, Brunehaut fell into the hands of Chilperic; but Gondebaud, one of Sigebert's beſt generals, made his eſcape into Auſtraſia with Childebert, the only ſon of Sigebert, an infant of about five years of age, who was immediately proclaimed king in room of his father. In a ſhort time, however, Meroveus, eldeſt ſon to Chilperic, fell in love with Brunehaut, and married her without acquainting his father. Chilperic, on this news, immediately went to Rouen, where Meroveus and his conſort were; and having ſeized them, ſent Brunehaut and her two daughters to Metz, and carried Meroveus to Soiſſons. Soon after, one of his generals being defeated by Gontran, who eſpouſed Brunehaut's cauſe, Chilperic in a fit of rage cauſed Meroveus to be ſhaved and confined in a monaſtery. From hence he found means to make his eſcape, and with great difficulty arrived in Auſtraſia, where Brunehaut would gladly have protected him: but the jealouſy of the nobles was ſo ſtrong, that he was forced to leave that country; and being betrayed into the hands of his father's forces, was murdered, at the inſtigation of Fredegonde, as was generally believed.

The French empire was at this time divided between Gontran king of Orleans, called alſo king of Burgundy, Chilperic king of Soiſſons, and Childebert king of Auſtraſia. Chilperic found his affairs in a very diſagreeable ſituation. In 579, he had a diſpute with Varoc count of Bretagne, who refuſed to do him homage. Chilperic diſpatched a body of troops againſt him; who were defeated, and he was then forced to clap up a diſhonourable peace. His brother and nephew lived in ſtrict union, and had no reaſon to be very well pleaſed with him. His own ſubjects, being oppreſſed with heavy taxes, were miſerably poor and diſcontented. His ſon Clovis, by a former queen named *Andovera*, hated Fredegonde, and made no ſecret of his averſion. To add to his embaraſſment, the ſeaſons were for a long time ſo unfavourable, that the country was threatened with famine and peſtilence at the ſame time. The king and queen were both attacked by an epidemic diſeaſe which then raged. They recovered: but their three ſons, Clodobert, Samſon, and Dagobert, died; after which, the ſight of Clovis became ſo diſagreeable to Fredegonde, that ſhe cauſed him to be murdered, and likewiſe his mother Andovera, leſt Chilperic's affection for her ſhould return after the tragical death of her ſon.

13 And likewiſe Chilperic.

In 583 Chilperic himſelf was murdered by ſome unknown aſſaſſins, when his dominions were on the point of being conquered by Gontran and Childebert, who had entered into a league for that purpoſe. After his death Fredegonde implored the protection of Gontran for herſelf and her infant ſon Clotaire; which he very readily granted, and obliged Childebert to put an end to the war. He found himſelf, however, greatly diſficulted to keep Fredegonde and Brunehaut in awe; for theſe two princeſſes having been long rivals and implacable enemies, were continually plotting the deſtruction of each other. This, however, he accompliſhed by favouring ſometimes Brunehaut and ſometimes Fredegonde; ſo that, during his life, neither of them durſt undertake any thing againſt the other.

14
Death of Gontran.

On the 28th of March 593, died Gontran, having lived upwards of 60, and reigned 32 years. Childebert ſucceeded to his dominions without oppoſition, but did not long enjoy them; he himſelf dying in the year 596, and his queen ſhortly after. His dominions were divided between his two ſons Theodobert and Thierri; the firſt of whom was declared king of Auſtraſia, and the latter king of Burgundy. As Theodobert was only in the 11th year of his age, and Thierri in his 10th, Brunehaut governed both kingdoms with an abſolute ſway. Fredegonde, however, took care not to let ſlip ſuch a favourable opportunity as was offered her by the death of Childebert, and therefore made herſelf miſtreſs of Paris and ſome other places on the Seine. Upon this Brunehaut ſent againſt her the beſt part of the forces in Auſtraſia, who were totally defeated; but Fredegonde died before ſhe had time to improve her victory, leaving her ſon Clotaire heir to all her dominions.

15
And Fredegonde.

For ſome time Brunehaut preſerved her kingdom in peace; but in the end her own ambition proved her ruin. Inſtead of inſtructing Theodobert in what was neceſſary for a prince to know, ſhe took care rather to keep him in ignorance, and even ſuffered him to marry a young and handſome ſlave of his father's. The new queen was poſſeſſed of a great deal of affability and good-nature; by which means ſhe in a ſhort time gained the affection of her huſband ſo much, that he readily conſented to the baniſhment of Brunehaut. Upon this diſgrace ſhe fled to Thierri king of Burgundy, in the year 599. By him ſhe was very kindly received; and inſtead of exciting jealouſies or miſunderſtandings between the two brothers, ſhe engaged Thierri to attempt the recovery of Paris and the other places which had been wreſted from their family by Fredegonde, procuring at the ſame time a conſiderable body of auxiliaries from the Viſigoths. This meaſure was ſo acceptable to Theodobert, that he likewiſed raiſed a numerous army, and invaded Clotaire's dominions in conjunction with his brother. A battle enſued, in which the forces of Cloitaire were totally defeated, and himſelf obliged ſoon after to ſue for peace; which was not granted, but on condition of his yielding up the beſt part of his dominions.

16
Brunehaut baniſhed.

This treaty was concluded in the year 600; but three years afterwards, it was broken by Clotaire. He was again attacked by the two brothers, and the war carried on with great vigour till the next ſpring. At this time Thierri having forced Landri, Clotaire's general, to a battle, gave him a total overthrow, in which the king's infant ſon Merovæus, whom he had ſent along with Landri, was maſſacred; to gratify, as Clotaire pretended, the malice of Brunehaut. After this victory, Thierri marched directly to Paris; fully bent on the deſtruction of his couſin, which now ſeemed inevitable. This, however, was prevented by Theodobert; who no ſooner heard of the victory gained by Thierri, than he became jealous of his ſucceſs, and offered Clotaire ſuch terms of peace as he gladly accepted. The latter having then nothing to fear on the ſide of Auſtraſia, quickly compelled Thierri to liſten to terms of accommodation alſo.

This behaviour of Theodobert greatly provoked his brother; and his reſentment was highly inflamed by Brunehaut, who never forgot her diſgrace in being baniſhed from his court. A war was therefore commenced between the two brothers in 605; but it was ſo highly diſapproved of by the nobility, that Thierri found himſelf obliged to put an end to it. The tranquillity which now took place, was again diſturbed in 607, by Theodobert's ſending an embaſſy to demand ſome part of Childebert's dominions which had been added, by the will of that monarch, to thoſe of Burgundy. The nobility of both kingdoms were ſo much averſe to war, that they conſtrained their kings to conſent to a conference, attended by an equal number of troops; but Theodobert, by a ſcandalous breach of his faith, brought double the number, and compelled his brother to ſubmit to what terms he pleaſed. This piece of treachery inſtantly brought on a war; for Thierri was bent on revenge, and his nobility no longer oppoſed him. It was neceſſary, however, to ſecure Clotaire by a negociation; and accordingly a promiſe was made of reſtoring thoſe parts of his dominions which had formerly been taken from him, provided he would remain quiet. This treaty being finiſhed, Thierri entered Theodobert's dominions, defeated him in two battles, took him priſoner, uſed him with the utmoſt indignity; and having cauſed an infant ſon of his to be put to death, ſent him to his grandmother Brunehaut. By her orders he was firſt ſhaved and confined in a monaſtery; but afterwards, fearing leſt he ſhould make his eſcape, ſhe cauſed him to be put to death.—Clotaire, in the mean time, thought that the beſt method of making Thierri keep his word was to ſeize on thoſe places which he had promiſed to reſtore to him, before his return from the war with Theodobert. This he accordingly did; and Thierri no ſooner heard of his having done ſo, than he ſent him a meſſage requiring him to withdraw his forces, and, in caſe of his refuſal, declared war. Clotaire was prepared for this; and accordingly aſſembled all the forces in his dominions, in order to give him a proper reception. But before Thierri could reach his enemies, he was ſeized with a dyſentery; of which he died in the year 612, having lived 26 years, and reigned 17.

17
Death of Thierri.

On the death of Thierri, Brunehaut immediately cauſed his eldeſt ſon, named *Sigiſbert*, then in the 10th year of his age, to be proclaimed king. It is probable that ſhe intended to have governed in his name with an abſolute ſway; but Clotaire did not give her time to diſcover her intentions. Having great intelligence in Auſtraſia and Burgundy, and knowing that the nobility in both kingdoms were diſaffected to Brunehaut, he declared war againſt her; and ſhe being betrayed by her generals, fell into the hands of her enemies. Clotaire gave her up to the nobles; who generally hated her, and who uſed her in the moſt cruel manner. After having led her about the camp, expoſed to the inſults of all who had the meanneſs to inſult her, ſhe was tied by the leg and arm to the tail of an un-

18
Brunehaut put to a cruel death.

untamed horſe, which, ſetting off at full ſpeed, quickly daſhed out her brains. After this her mangled body was reduced to aſhes, which were afterwards interred in the abbey of St Martin at Autun.

Thus Clotaire became ſole monarch of France; and quietly enjoyed his kingdom till his death, which happened in the year 628. He was ſucceeded by Dagobert; who proved a great and powerful prince, and raiſed the kingdom of France to a high degree of ſplendor. Dagobert was ſucceeded by his ſons Sigebert and Clovis; the former of whom had the kingdom of Auſtraſia, and the latter that of Burgundy. Both the kings were minors at the time of their acceſſion to the throne, which gave an opportunity to the mayors of the palace (the higheſt officers under the crown) to uſurp the whole authority. Sigebert died in 640, after a ſhort reign of one year; leaving behind him an infant ſon named *Dagobert*, whom he ſtrongly recommended to the care of Grimoalde his mayor of the palace. The miniſter cauſed Dagobert to be immediately proclaimed king, but did not long ſuffer him to enjoy that honour. He had not the cruelty, however, to put him to death; but ſent him to a monaſtery in one of the Weſtern iſlands of Scotland; and then, giving out that he was dead, advanced his own ſon Childebert to the throne. Childebert was expelled by Clovis king of Burgundy; who placed on the throne Childeric, the ſecond ſon of Sigebert. Clovis died ſoon after the revolution, and was ſucceeded in his dominions by his ſon Clotaire; who died in a ſhort time, without iſſue. He was ſucceeded by his brother Childeric; who, after a ſhort reign, was murdered with his queen, at that time big with child, and an infant ſon named *Dagobert*; tho' another, named *Daniel*, had the good luck to eſcape.

The affairs of the French were now in the moſt deplorable ſituation, without king, magiſtrates, or law of any kind; nor did this confuſion end but with the total extinction of the family of Clovis. The princes of the Merovingian race were, in fact, deprived of their power by Pepin d'Heriſtal, who obliged Thierri king of Auſtraſia to receive him as mayor of the palace. He governed every thing in the moſt abſolute manner; but, however, conducted matters with ſo much prudence, that the nation was very much reſpected during the time of his adminiſtration, which continued 28 years. He died in 711, and was ſucceeded in his poſt by his youngeſt ſon Theudobalde, at that time but ſix years old. In 717, Theudobalde was expelled by Charles Martel, Pepin's ſon by a former wife, who compelled the nominal king at that time to own him as mayor of the palace. He was attended with ſurpriſing ſucceſs in all his undertakings; defeated the Arabs who invaded the kingdom *; overthrew the Friſons, and killed their duke with his own hands. At laſt he was choſen by pope Gregory III. for his protector. He offered to ſhake off his dependence on the Greek emperor, and to make Charles conſul at Rome, ſending him at the ſame time the keys of the tomb of St Peter. But while this affair was in agitation, Charles Martel died, and was ſucceeded in his power by his ſons Carloman and Pepin.

19
Exploits of Charles Martel.

Though Charles had never aſſumed the title of *ſovereign*, he divided the empire between his ſons as if he had been actually king. In 746, Carloman being weary of his greatneſs, retired into a convent, and thus left Pepin abſolute maſter of the empire; who, five years afterwards, reſolved to aſſume the title of *king*, as he had long poſſeſſed the authority of one. This prince, ſurnamed *le Bref*, or *the Short*, was the firſt of the ſecond race of French kings named *Carlovingian*; and was one of the greateſt and moſt prudent monarchs that ever ſat on the throne of France. He protected pope Stephen III. againſt Aſtolphus king of the Lombards, who had ſeized the exarchate of Ravenna, and inſiſted upon his being acknowledged king of Rome. Pepin conducted the pope, who had come to France, with an army back into Italy; beſieged Aſtolphus in Pavia; and obliged him to renounce, not only all claim to the ſovereignty of Rome, but alſo the exarchate of Ravenna, and all his other conqueſts in Italy. The exarchate he beſtowed upon the pope; who, however, did not conſider it as a gift from him, but only as the reſtoring to him a territory which was juſtly his right. Pepin was no ſooner gone, than Aſtolphus broke the treaty he had concluded, and laid ſiege to Rome itſelf. However, the king of France very ſoon returned, and forced him to accept of a peace on vaſtly worſe terms than before; after which he made a tour to Rome: but finding that his ſtay gave great uneaſineſs to the Greeks, as well as to the pope himſelf, he quickly left the city.

20
Reign of Pepin the Short.

After his return to his own dominions, Pepin employed himſelf in regulating the national affairs; but was ſoon obliged to take the field againſt the duke of Aquitaine, which country he entirely reduced in the ſpace of nine years. Soon after this, he died of a dropſy at St Denis, in the year 768, the 17th of his reign, and 54th of his life.

Pepin was ſucceeded by his two ſons Charles and Carloman. The latter, who was the younger, died in 769, the year after their acceſſion to the throne; and thus Charles became ſole maſter of the French empire, which he enlarged farther than ever it was either before or ſince. His firſt expedition was againſt the Saxons, who had long been tributaries to France, but frequently revolted, and now thought they had a good opportunity, by the death of Pepin, of freeing themſelves from that tribute, which they regarded as an intolerable grievance. Charles, however, entered their country with a great army; and having defeated them in a number of ſmall engagements, advanced to their capital poſt of Ereſbourg near Paderborn; where was the temple of their god Irminſul, repreſented as a man completely armed, with a ſtandard in one hand, placed on a column. The Saxons made an obſtinate defence; but were at laſt obliged to yield, and Charles employed his army three days in demoliſhing the monuments of pagan ſuperſtition in this place. This diſheartened them to ſuch a degree, that they ſubmitted to whatever terms he choſe to preſcribe; and which were rendered eaſier to them than, perhaps, they would have been, by the news which Charles now received from Italy.

21
Of Charles the Great.

Didier, king of the Lombards, having ſeized and frighted to death pope Stephen IV. endeavoured to the utmoſt of his power to reduce his ſucceſſor Adrian I. to a ſtate of dependence. The pope implored the aſſiſtance of Charles againſt his adverſaries, and this Charles was very ready of himſelf to grant; but the nobility were ſo much averſe to an Italian war, that he was obliged to act with the greateſt circumſpection.

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* See *Arabia*, nº 174.

He ſent, therefore, ſeveral embaſſies to Didier; in which, after expreſſing a great deſire to preſerve a ſtrict harmony between the two nations, he at length offered him a large ſum of money if he would reſtore the places he had taken from the pope. Theſe offers being rejected, Charles at length obtained the conſent of his nobility, and ſet out for Lombardy with a powerful army. Didier, however, had made ſuch excellent diſpoſitions, that all Charles's officers reckoned it would be impoſſible for him to force a paſſage. But Didier's troops being ſeized with a ſudden panic, abandoned all their poſts, and retired with precipitation. Charles purſued them with ſuch impetuoſity, that numbers were killed. Didier with one part of the troops took ſhelter in Pavia; the reſt, under the command of his only ſon Adalgiſe, threw themſelves into Verona. Charles formed the ſiege of both places at once. Both of them were taken, after making a vigorous reſiſtance. Didier fell into the hands of Charles, who carried him priſoner into France; but Adalgiſe eſcaped to Conſtantinople: after which all the other places of ſtrength in the country ſubmitted to the conqueror, and thus Charles became maſter of the whole kingdom of the Lombards in a ſingle campaign.

22
He conquers the Lombards.

After this ſucceſs the king ſet out for Rome, whence he was very ſoon recalled by the news of a freſh revolt of the Saxons. Them he quickly reduced; but was next year obliged to return into Italy, in order to ſubdue ſome of the Lombard lords who had ſet up for independent princes. While he was employed in ſubduing them, the Saxons revolted, ſo that Charles found himſelf again under a neceſſity of returning into Germany. They ſubmitted in a ſhort time, and promiſed to become Chriſtians; and the king took care now to force them to keep their promiſes, by building forts in ſeveral parts of the country.

23
His conqueſts in Spain and Germany.

In 778, being invited by ſome Mooriſh lords, he made an expedition into Spain. Here he took Pompeluna and Saragoſſa; after which, the emirs of Hueſca and Jacca voluntarily ſubmitted to him, as did alſo the governor of Barcelona and Gironne. Having taken all methods in his power to ſecure his new conqueſts, he ſet out on his return; but the Gaſcons, having attacked the rear of his army, cut off great numbers of his men. In 779 and 780, he was employed in quelling new inſurrections in Saxony and Italy. The Saxons he treated with the utmoſt cruelty, cauſing 4500 priſoners to be beheaded at once, becauſe they could not deliver up Witikind, one of their chiefs who had fled into Denmark. This piece of barbarity ſoon excited a general revolt; and it was not till the year 785, that Charles was able totally to reduce them. This, however, he at laſt accompliſhed, after having made terrible devaſtation.

All the endeavours of this great monarch, however, to keep his new ſubjects quiet, were ineffectual. He had no ſooner finiſhed this laſt conqueſt of the Saxons, than he was called into Italy to quiet ſome new inſurrections which had taken place there. This was no ſooner accompliſhed, than he was obliged to take the field againſt the Sclavonians, who haraſſed ſome of his Germans ſubjects. In the mean time the duchy of Bavaria was haraſſed by the Hunns to ſuch a degree, that after ſubduing the Sclavonians, Charles found it neceſſary to turn his arms againſt them. But while he meditated this expedition the Saxons again revolted, and new troubles broke out in Italy. Charles behaved with the greateſt prudence and reſolution. In 794, he marched againſt the Saxons; and ſo great was their fear of him, that their army began to diſband as ſoon as he entered the country. Upon this the Saxon chiefs ſued for peace; which they could obtain upon no other terms than that they ſhould receive the Chriſtian clergy, and deliver up a third part of the army to be ſent wherever he pleaſed. Hard as this laſt article was, they complied with it; and Charles diſtributed theſe Saxon troops on the coaſts of Holland and Flanders, where they proved of great uſe in repelling the invaſions of the Normans, who about this time began to be formidable. The war with the Abares, or Hunns, was conducted by Pepin ſon to Charles, whom he had appointed king of Italy, and who is ſaid to have almoſt extirpated the nation. After this Charles himſelf returned into Italy; and having there quieted all diſturbances, he proceeded to Rome, where he was ſolemnly crowned emperor of the Weſt by pope Leo III. in the year 800. He continued to reign with uninterrupted proſperity till the year 813; when he died of a pleuriſy on the 28th of January, leaving the empire to his only ſurviving ſon, Lewis king of Aquitaine, whom he had before taken for his partner in the imperial dignity.

24
Is crowned emperor of the Weſt.

The good fortune of Charles did not deſcend to his children. Lewis, though a very mild and religious prince, was by no means fit for governing thoſe turbulent nations with whom he had to do. His reign, therefore, was a continued ſcene of troubles. His own children conſpired againſt him; and more than once made him priſoner, and treated him with the utmoſt indignity. Lothaire, the eldeſt, even pronounced a formal ſentence of depoſition againſt him. At laſt, however, this ungrateful prince was obliged to ſubmit to his father, and aſk his pardon in the moſt humble manner; who forgave him, and did not puniſh his aſſociates with ſuch ſeverity as they deſerved. This lenity produced a freſh cabal among his children; and before they could be reduced the emperor died, being worn out with ſickneſs and grief for the unnatural conduct of his ſons.

Lewis left behind him three ſons: Lothaire, whom he had aſſociated with himſelf in the empire; Lewis, king of Bavaria; and Charles, only 17 years of age, king of France, under the tuition of his mother. On the death of their father, however, Lothaire attempted to ſeize the whole empire for himſelf; but after a long and ruinous war with his two brothers, was forced to conſent to a new diviſion: by which Charles had Aquitaine and all the country between the Loire and the Meuſe; Lewis had the whole of Germany; and Lothaire, beſides Italy, had the whole tract of country lying within the rivers Rhone, Rhine, Saone, Meuſe, and Scheld. The whole of what he held on this ſide of the mountains, was from him called *Lotharingia*, and by corruption *Lorrain;* though this name is now given to a duchy which contains only a ſmall part of that kingdom.

25
Empire divided into three parts.

26
Decline of its ſtrength.

This diviſion happened in the year 845; and the empire was now ſo much weakened by the civil wars which had preceded, that it became a prey to the barbarous nations, who invaded it in on all ſides. The Spaniſh dominions were almoſt entirely loſt; the Bretons revolted, and could not be ſubdued; and in 855, Lothaire

France.

thaire died, leaving his dominions among his three ſons: ſo that, by the ſetting up of ſo many independent ſovereigns, it was next to impoſſible that the empire could preſerve its tranquillity, which had been ſo dearly bought. In fact, for a long time the hiſtory of France affords nothing but an account of civil diſcords. Charles (ſurnamed the *Bald*), king of France, by deceit got himſelf crowned emperor in preference to Lewis, who was his elder brother; and having made himſelf maſter of Italy, he thought it would be an eaſy matter to ſeize on all the dominions of his brother Lewis, who died about the year 876. In this, however, he was deceived; being defeated with great loſs, and obliged totally to abandon the enterprize. Next year he himſelf was poiſoned by a Jewiſh phyſician named *Zedechias;* and died in the 34th year of his reign, and 54th of his age.

Charles the Bald was ſucceeded by his only ſon, named *Lewis;* and, from an impediment in his ſpeech, ſurnamed the *Stammerer*. He was a prince of no great abilities; and as he found the affairs of the kingdom in conſiderable diſorder at the time of his acceſſion, ſo it was not in his power to extricate them from it. He died on the 10th of April 879, while on a march to ſuppreſs ſome inſurrections in Burgundy. He left his queen Adelaide pregnant; who ſome time after his deceaſe was delivered of a ſon, named *Charles*. After his death followed an interregnum; during which a faction was formed for ſetting aſide the children of Lewis the Stammerer, in favour of the German princes, ſons to Lewis the brother of Charles the Bald. This ſcheme, however, proved abortive; and the two ſons of the late king, Lewis and Carloman, were crowned kings of France. Another kingdom, however, was at that time erected by an aſſembly of the ſtates, namely, the kingdom of Provence, which conſiſted of the countries now called *Lyonnois*, *Savoy*, *Dauphiny*, *Franche Comte*, and part of the duchy of Burgundy; and this kingdom was given to duke Boſon, brother-in-law to Charles the Bald. In 881, both kings of France died; Lewis, as was ſuſpected, by poiſon; and Carloman of a wound he received accidentally while hunting. This produced a ſecond interregnum; which ended with the calling in of Charles the Groſs, emperor of Germany. His reign was more unfortunate than that of any of his predeceſſors. The Normans, to whom he had given leave to ſettle in Frieſland, ſailed up the Seine with a fleet of 700 ſhips, and laid ſiege to Paris. Charles, unable to force them to abandon their undertaking, prevailed on them to depart by a large ſum of money. But as the king could not advance the money at once, he allowed them to remain in the neighbourhood of Paris during the winter; and they in return plundered the country, thus amaſſing vaſt wealth beſides the ſum which Charles had promiſed. After this ignominious tranſaction Charles returned to Germany, in a very declining ſtate of health both as to body and mind. Here he quarrelled with his empreſs; and being abandoned by all his friends, he was depoſed, and reduced to ſuch diſtreſs, that he would not even have had bread to eat, had not he been ſupplied by the archbiſhop of Mentz, out of a principle of charity.

On the depoſition of Charles the Groſs, Eudes count of Paris was choſen king by the nobility during the minority of Charles the ſon of Adelaide, afterwards named *Charles the Simple*. He defeated the Normans, and repreſſed the power of the nobility; on which account a faction was formed in favour of Charles, who was ſent for, with his mother, from England. Eudes did not enter into a civil war; but peaceably reſigned the greateſt part of the kingdom to him, and conſented to do homage for the reſt. He died ſoon after this agreement, in the year 898.

During the reign of Charles the Simple, the French government declined. By the introduction of fiefs, thoſe noblemen who had got into the poſſeſſion of governments, having theſe confirmed to them and their heirs for ever, became in a manner independent ſovereigns: and as theſe great lords had others under them, and they in like manner had others under them, and even theſe again had their vaſſals; inſtead of the eaſy and equal government which prevailed before, a vaſt number of inſupportable little tyrannies were erected. The Normans, too, ravaged the country in the moſt terrible manner, and deſolated ſome of the fineſt provinces in France. At laſt Charles ceded to Rollo, the king or captain of theſe barbarians, the duchy of Neuſtria; who thereupon became Chriſtian, changed his own name to *Robert*, and that of his principality to *Normandy*.

27
Family of Charles the Great ſupplanted by Hugh Capet

During the remainder of the reign of Charles the Simple, and the entire reigns of Lewis IV. ſurnamed the *Stranger*, Lothaire, and Lewis V. the power of the Carlovingian race continually declined; till at laſt they were ſupplanted by Hugh Capet, who had been created duke of France by Lothaire. This revolution happened in the year 987, and was brought about much in the ſame manner as the former one had been by Pepin. He proved an active and prudent monarch, and poſſeſſed ſuch other qualities as were requiſite for keeping his tumultuous ſubjects in awe. He died on the 24th of October 997, leaving his dominions in perfect quiet to his ſon Robert.

28
Robert.

The new king inherited the good qualities of his father. In his reign the kingdom was enlarged by the death of Henry duke of Burgundy, the king's uncle, to whom he fell heir. This new acceſſion of territory, however, was not obtained without a war of ſeveral years continuance, on account of ſome pretenders to the ſovereignty of that duchy; and had it not been for the aſſiſtance of the duke of Normandy, it is doubtful whether the king would have ſucceeded.—As Robert was of opinion, that peace and tranquillity were preferable to wide extended dominions with a precarious tenure, he refuſed the kingdom of Italy and the imperial crown of Germany, both which were offered him. He died on the 20th of July 1030; having reigned 33 years, and lived 60.

29
Henry I.

Robert was ſucceeded by his eldeſt ſon Henry I. who in the beginning of his reign met with great oppoſition from his mother. She had always hated him; and preferred his younger brother Robert, in whoſe favour ſhe now raiſed an inſurrection. By the aſſiſtance of Robert duke of Normandy, however, Henry overcame all his enemies, and eſtabliſhed himſelf firmly upon the throne. In return for this, he ſupported William, Robert's natural ſon, and afterwards king of England, in the poſſeſſion of the duchy of Normandy. Afterwards, however, growing jealous of his power, he not only ſupported the pretenders to the duchy of

Normandy ſecretly, but invaded that country himſelf in their favour. This enterprize proved unſucceſsful, and Henry was obliged to make peace: but no ſincere reconciliation ever followed; for the king retained a deep ſenſe of the diſgrace he had met with, and the duke never forgave him for invading his dominions. The treaty between them, therefore, was quickly broken; and Henry once more invaded Normandy with two armies, one commanded by himſelf, and the other by his brother. The firſt was haraſſed by continual ſkirmiſhes, and the laſt totally defeated; after which Henry was obliged to agree to ſuch terms as the duke thought proper: but the rancour between them never ceaſed, and was in reality the cauſe of that implacable averſion which for a long ſeries of years produced perpetual quarrels between the kings of France and thoſe of the Norman race in England.

30 Philip.

Henry died in 1059, not without a ſuſpicion of being poiſoned; and was ſucceeded by his eldeſt ſon Philip, at that time in the eighth year of his age. Baldwin earl of Flanders was appointed his guardian; and died in the year 1066, about the time that William of Normandy became king of England. After the death of his tutor, Philip began to ſhew a very inſincere, haughty, and oppreſſive diſpoſition. He engaged in a war with William the Conqueror, and ſupported his ſon Robert in his rebellion againſt him *. But after the death of William, he aſſiſted Robert's brothers againſt him, by which means he was forced to conſent to a partition of his dominions.

In 1092, king Philip being wearied of his queen Bertha, procured a divorce from her under pretence of conſanguinity, and afterwards demanded in marriage Emma daughter to Roger count of Calabria. The treaty of marriage was concluded; and the princeſs was ſent over, richly adorned with jewels, and with a large portion in ready money: but the king, inſtead of eſpouſing her, carried off from her huſband the counteſs of Anjou, who was eſteemed the handſomeſt woman in France. With her he was ſo deeply enamoured, that not ſatisfied with the illegal poſſeſſion of her perſon, he procured a divorce between her and her huſband, and prevailed upon ſome Norman biſhops to ſolemnize his own marriage with her. The whole of theſe tranſactions, however, were ſo ſcandalous, that the pope having cauſed them to be reviſed in a council at Autun, in the year 1094, pronounced ſentence of excommunication againſt Philip in caſe he did not part with the counteſs. On his repentance, the cenſure was taken off; but as the king paid no regard to his promiſes, he was, in 1095, excommunicated a ſecond time. He again profeſſed repentance, and was abſolved; but ſoon after, living with the counteſs of Anjou as formerly, he was excommunicated a third time. This conduct, ſo unworthy of a prince, expoſed him to the contempt of the people. Too many of the nobility followed his example, and at the ſame time deſpiſed his authority; not only making war upon each other, but ſpoiling and robbing his ſubjects with impunity.

In the year 1110, Philip prevailed on the court of Rome to have his affair reviewed in an aſſembly at Poictiers; where, notwithſtanding his utmoſt efforts, ſentence of excommunication was a fourth time pronounced againſt him. Yet, in ſpite of all theſe ſentences, as queen Bertha was dead, and the count of Anjou offered, for a large ſum of money, to give whatever aſſiſtance was requiſite for procuring a diſpenſation, Philip at laſt prevailed, and the counteſs was proclaimed queen of France. But tho' the king's domeſtic affairs were now in ſome meaſure quieted, his negligence in government had thrown the affairs of the nation into the greateſt diſorder. He therefore aſſociated with him in the government his eldeſt ſon Lewis. This prince was the very reverſe of his father; and by his activity and reſolution, keeping conſtantly in the field with a conſiderable body of forces, he reduced the rebellious nobility to ſubjection, and, according to the beſt hiſtorians, at this time ſaved the ſtate from being utterly ſubverted.

For theſe ſervices the queen looked upon the young prince with ſo jealous an eye, and gave him ſo much diſturbance, that he found it neceſſary to retire for ſome time into England; where he was received by king Henry I. with the greateſt kindneſs. He had not been long at court, before Henry received, by an expreſs, a letter from Philip; telling him, that, for certain important reaſons, he ſhould be glad if he cloſely confined his ſon, or even diſpatched him altogether. The king of England, however, inſtead of complying with this infamous requeſt, ſhewed the letter to Lewis, and ſent him home with all imaginable marks of reſpect. Immediately on his return, he demanded juſtice; but the queen procured poiſon to be given him, which operated ſo violently that his life was deſpaired of. A ſtranger, however, undertook the cure, and ſucceeded; only a paleneſs remained in the prince's face ever afterwards, though he grew ſo fat that he was ſurnamed *the Groſs*.

On his recovery, the prince was on the point of revenging his quarrel by force of arms; but his father having cauſed the queen to make the moſt humble ſubmiſſions to him, his reſentment was at length appeaſed, and a perfect reconciliation took place.

Nothing memorable happened in the reign of king Philip after this reconciliation. He died in the year
1108, and was ſucceeded by his ſon Lewis the Groſs. 31 Lewis the Groſs.
The firſt years of his reign were diſturbed by inſurrections of his lords in different places of the kingdom; and theſe inſurrections were the more troubleſome, as they were ſecretly fomented by Henry I. of England, that by weakening the power of France his duchy of Normandy might be the more ſecure. This quickly brought on a war; in which Henry was defeated, and his ſon William obliged to do homage to Lewis for the duchy of Normandy. As the kings of England and France, however, were rivals, and exceedingly jealous of each other, the latter eſpouſed the cauſe of William the ſon of Robert duke of Normandy, whom Henry had unjuſtly deprived of that duchy. This brought on a new war; in which Lewis, receiving a great defeat from Henry, was obliged to make peace upon ſuch terms as his antagoniſt thought proper. This tranquillity, however, was but of ſhort duration. Lewis renewed his intrigues in favour of William, and endeavoured to form a confederacy againſt Henry. In this, however, he was diſappointed. Henry found means not only to diſſipate this confederacy, but to prevail upon Henry V. emperor of Germany to invade France with the whole

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* See *England*, nº 88.

whole ſtrength of the empire on one ſide, while he prepared to attack it on the other. But, Lewis having collected an army of 200,000 men, both of them thought proper to deſiſt. Upon this the king of France would have marched into Normandy, in order to put William in poſſeſſion of that duchy. His great vaſſals, however, told him they would do no ſuch thing; that they had aſſembled in order to defend the territories of France from the invaſion of a foreign prince, and not to enlarge his power by deſtroying that balance which aroſe from the king of England's poſſeſſion of Normandy, and which they reckoned neceſſary for their own ſafety. This was followed by a peace with Henry; which, as both monarchs had now ſeen the extent of each other's power, was made on pretty equal terms, and kept during the life of Lewis, who died in 1137, leaving the kingdom to his ſon Lewis VII.

32 Lewis VII. a weak prince.

The young king was not endowed with any of thoſe qualities which conſtitute a great monarch. From the ſuperſtition common to the age in which he lived, he undertook an expedition into the Holy Land, from whence he returned without glory. In this expedition he took his queen Eleanor along with him; but was ſo much offended with her gallantries during her ſtay there, as well as her behaviour afterwards, that he divorced her, and returned the duchy of Guienne which he received with her as a portion. Six weeks after this ſhe married Henry duke of Normandy, count of Anjou and Maine, and heir apparent to the crown of England. This marriage was a very great mortification to Lewis; and procured him the ſirname of *the Young*, on account of the folly of his conduct. When Henry aſcended the throne of England, ſome wars were carried on between him and Lewis, with little advantage on either ſide: at laſt, however, a perfect reconciliation took place; and Lewis took a voyage to England, in order to viſit the ſhrine of St Thomas of Canterbury. On his return he was ſtruck with an apoplexy; and though he recovered for that time, yet he continued ever after paralytic on the right ſide. After having languiſhed for about a year under this malady, he died on the 18th of September 1180, leaving the kingdom to his ſon Philip.

33 Philip the Great.

This prince, ſurnamed *The Gift of God*, *The Magnanimous*, and *The Conqueror*, during his lifetime; and, as if all theſe titles had fallen ſhort of his merit, ſtyled *Auguſtus* after his death,—is reckoned one of the greateſt princes that ever ſat on the throne of France, or any other.—It doth not, however, appear that theſe titles were altogether well founded. In the beginning of his reign he was oppoſed by a ſtrong faction excited by his mother. Them indeed he repreſſed with a vigour and ſpirit which did him honour; but his taking part with the children of Henry II. of England in their unnatural conteſts with their father, and his treacherous combination with John to ſeize his brother's kingdom when he was detained in priſon by the emperor of Germany, muſt be indelible ſtains in his character, and for ever exclude him from the title of *Magnanimous*. As to military ſkill and perſonal valour, he was evidently inferior to Richard I. of England; nor can his recovering of the provinces held by the Engliſh in France, from ſuch a mean and daſtardly prince as king John, entitle him with any juſtice to the ſurname of *Conqueror*. In politics he was evidently the dupe of the Pope, who made uſe of him to intimidate John into a ſubmiſſion, by promiſing him the kingdom of England, which he never meant that he ſhould enjoy. An account of theſe tranſactions, which are the principal ones of this reign, is given under the article ENGLAND, n° 119——139.

34 Reign of Lewis IX.

Philip died in 1223, and was ſucceeded by his ſon Lewis VIII.; and he, in 1226, by Lewis IX. afterwards ſtyled *St Lewis*. This prince was certainly poſſeſſed of many good qualities, but deeply tinctured with the ſuperſtition of the times. This induced him to engage in two croiſades. The firſt was againſt the Saracens in Egypt: in which he was taken priſoner by the Infidels, and treated with great cruelty; but at laſt obtained his ranſom, on condition of paying a million of pieces of gold, and ſurrendering the city of Damietta. He no ſooner regained his liberty, than he entered Syria with a view of doing ſomething worthy of his rank and character. From this expedition he was obliged to return ſooner than he intended, by the news of the deceaſe of his mother queen Blanch, whom he had appointed regent in his abſence, and who had managed the national affairs with the greateſt prudence. The king, however, found many diſorders in the kingdom upon his return; and theſe he ſet himſelf to reform with the utmoſt diligence. Having ſucceeded in this, he yielded to Henry III. of England, the Limouſin, Querci, Perigord, and ſome other places; in conſideration of Henry and his ſon prince Edward their renouncing, in the fulleſt manner, all pretenſions to Normandy and the other provinces of France which the Engliſh had formerly poſſeſſed.

The reputation of this monarch for candour and juſtice was ſo great, that the barons of England, as well as king Henry III. conſented to make him umpire of the differences which ſubſiſted between them. But though he decided this matter very juſtly, his deciſion was not productive of any good effect. At laſt the king, having ſettled every thing relating to his kingdom in a proper manner, ſet out on another croiſade for Africa; where he died of the plague, on the 25th of Auguſt 1270.

During the reigns of Philip the Hardy, Philip the Fair, Lewis *Hutin* or the *Quarrelſome*, Philip the Tall, and Charles the Fair, the French hiſtory affords no tranſactions which much affected the general ſtate of the kingdom. The government, however, ſeems to have declined; the nation to have been in low circumſtances; and the ſeeds of thoſe diſorders ſown, which now brought it to the brink of ruin.

35 Cauſe of the war with Edward III. of England.

Charles the Fair died in 1328 without male iſſue, but leaving his queen pregnant. As it was neceſſary in this caſe to appoint a regent, Philip count of Valois offered himſelf. His title was founded on his being the late king's couſin-german, and his neareſt heir-male deſcended from a male. This title was diſputed by Edward III. of England; who inſiſted, that he, as nephew to the deceaſed king, was a nearer relation than Philip. He acknowledged indeed, that his own title came by a female; but though he owned that females were incapable of holding the crown of France for themſelves, yet he maintained that this incapacity did not extend to their male deſcendants. The parliament of France, however, thought otherwiſe; and therefore ſuſtained Philip's claim to the regency, in preference to that of Edward. Soon after, the queen dowager was delivered of a princeſs, and thus Philip became poſſeſſed of the crown; and his attaining it in this manner procured him the ſurname of *the Fortunate*.

Philip was crowned at Rheims on the 29th of April 1328; and next year Edward III. of England came over to France, in order to do homage for the territories he had in that country, and to lay claim to ſome lands in Guienne. Great diſputes aroſe about the nature of the homage he was to pay: Philip, however, contented himſelf with receiving homage in general terms; and was afterwards to examine his own archives at leiſure, in order to determine what the nature of it was. On theſe terms Edward did homage in the cathedral at Amiens, on the 6th of June; and very ſoon after returned to England.

After a reaſonable delay, the king ſent ambaſſadors into England, in order to explain the nature of the homage which Edward had done; and Edward being at that time embaraſſed with his domeſtic affairs, found it requiſite to own the homage to be of that nature which he knew to be agreeable to Philip. Soon after this, Edward again came over to France in order to ſettle ſome new diſputes; and in a little time returned to England in perfect friendſhip with the French monarch. This diſpoſition, however, was of no long duration. Philip having found it neceſſary to baniſh Robert de Artois his own brother-in-law, on account of ſome criminal practices, the latter fled to England; where being well received by Edward, he never ceaſed to incenſe him againſt Philip.

As both monarchs were poſſeſſed of great prudence and ſagacity, they ſoon penetrated each other's deſigns. Philip, under pretence of taking the croſs, began to make prodigious armaments, ſtrengthening himſelf at the ſame time by alliances on every ſide; while Edward, determining to renew his claim to the crown of France, projected the conqueſt of Scotland. This, however, he could not accompliſh; and in the mean time Philip, in order to favour the Scots, with whom he was in alliance, ſuffered his ſubjects to make irruptions into Guienne.

36 Edward's firſt expedition.

In 1337, the war broke out openly. Philip having detached a ſquadron of his fleet againſt the Infidels, employed the reſt, conſiſting chiefly of Genoeſe veſſels, againſt the Engliſh. As in this war it was of great importance which ſide was taken by the Flemings, theſe people were courted by both parties. Lewis count of Flanders declared for Philip, but his ſubjects were more inclined to king Edward. James Arteville a brewer, the moſt able and artful man in the country, governed them at that time as much as if he had been their prince; and, the advantages ariſing from the Engliſh commerce determining him in favour of Edward, that prince, at his requeſt, embarked for Sluys with a numerous army. Here he landed in 1338; and on his firſt landing, it was reſolved that the German princes in alliance with him ſhould act againſt France. But for this a pretence was wanting. The vaſſals of the empire could not act by Edward's orders, or even as his allies, without directions from the emperor, and he was in league with France. This difficulty, however, was ſoon overcome: the French had made themſelves maſters of Cambray, and the emperor reſolved that it ſhould be retaken. With this view he created Edward *Vicar General of the Empire;* an empty title, but which ſeemed to give him a right of commanding the ſervices of the princes of Germany. The Flemings, who were vaſſals of France, likewiſe pretended ſcruples at invading the territories of their liege lord. To quiet theſe, Edward, by the advice of Arteville, aſſumed the title of *king of France;* and by virtue of this right, challenged their aſſiſtance for dethroning Philip de Valois, the uſurper of his kingdom. This ſtep, which, he feared, would beget endleſs animoſities and jealouſies, he did not take without heſitation; and, according to Mr Hume, from this time we may date the commencement of that great animoſity which the Engliſh have always borne to the French.

Edward's firſt attempt was upon the city of Cambray, to which he laid ſiege; but in a ſhort time he was prevailed upon by Robert de Artois, to raiſe the ſiege and march into Picardy. This country he entered with an army of near 50,000 men, compoſed moſtly of foreigners. Philip came within ſight of him with an army of near 100,000, compoſed chiefly of native ſubjects; and it was daily expected that a battle would enſue. But the Engliſh monarch was averſe to engage againſt ſo great a ſuperiority; and Philip thought it ſufficient if he eluded the attacks of his enemy, without running any unneceſſary hazard. The two armies faced each other for ſeveral days; mutual defiances were ſent; and Edward at laſt retired into Flanders, and diſperſed his army.

Such was the fruitleſs, and almoſt ridiculous concluſion of Edward's firſt expedition, which had plunged him into the greateſt difficulties. He had contracted near 300,000 pounds of debt; he had anticipated all his revenue; he had pawned every thing of value which belonged either to himſelf or his queen; nay, he was obliged in ſome meaſure even to pawn himſelf to his creditors, by deſiring their permiſſion to go over to England in order to procure ſupply, and by promiſing on his word of honour to return in perſon if he did not remit their money. On his arrival in England, however, he procured a large ſupply, ſufficient to enable him to make all the neceſſary preparations for a new invaſion; and ſo certain were the Engliſh that France would now be conquered, that the parliament, before Edward's departure, proteſted that they owed him no obedience as king of France, but that the two kingdoms muſt remain for ever diſtinct and independent.

37 His ſecond expedition.

The king of England ſet out on his ſecond expedition with a fleet of 240 veſſels. Philip had prepared a fleet of 400 veſſels, manned with 40,000 men; which he ſtationed off Sluys, in order to intercept him in his paſſage. The two fleets met on the 13th of June 1340; but the Engliſh, either by the ſuperior abilities of Edward, or the greater dexterity of his ſeamen, gained the wind of the enemy, and had the ſun in their backs; and with theſe advantages began the action. The battle was fierce and bloody: the Engliſh archers, whoſe force and addreſs were now much celebrated, galled the French on their approach; and when the ſhips grappled together, the example of the king and the nobility who were with him ſo animated the ſeamen and ſoldiers, that they maintained every where a ſuperiority over the enemy. The Flemings

38 The French entirely defeated at ſea.

mings, obſerving the battle, hurried out of their ports, and brought a reinforcement to the Engliſh; which, coming unexpectedly, had a greater effect than in proportion to its power and numbers. Two hundred and thirty French ſhips were taken; and 30,000 Frenchmen were killed, with two of their admirals: the loſs of the Engliſh was inconſiderable, compared to the greatneſs and importance of the victory. None of Philip's courtiers, it is ſaid, dared to inform him of the event; till his fool or jeſter gave him a hint, by which he diſcovered the loſs he had ſuſtained.

After this great victory, Edward landed his forces, and laid ſiege to Tournay. Philip marched to its relief with a very numerous army; but acted with ſo much caution, that Edward found himſelf in a manner blocked up in his camp: and the counteſs dowager of Hainault, ſiſter to Philip, mother-in-law to Edward, and ſiſter-in-law to Robert de Artois, coming out of a convent, to which ſhe had retired, interpoſed with ſo much ſpirit and addreſs, that ſhe engaged all parties to agree to a truce for a year; and might perhaps have brought about a peace, if ſhe had ſurvived.

39 Edward invited into France a third time.

In 1341, however, Edward's ambition was once more excited by the invitation of the count de Mountfort, who had poſſeſſed himſelf of the province of Brittany, and applied to Edward to ſecond his claims. An offer of this kind entirely coincided with Edward's moſt ſanguine deſires. He was happy in the promiſed aſſiſtance of Mountfort, an active and valiant prince, cloſely united to him by intereſt, and thus opening to him an entrance into the heart of France. Theſe flattering proſpects, however, were for a while damped by the impriſonment of Mountfort; whoſe aims being diſcovered, he was beſieged in the city of Nantz, and taken. But Jane of Flanders, his wife, ſoon made up for the loſs of her huſband. This lady courageouſly undertook to ſupport the falling fortunes of her family. She aſſembled the inhabitants of Rennes, where ſhe then reſided; and carrying her infant ſon in her arms, deplored her misfortunes, and attempted to inſpire the citizens with an affection for her cauſe. The inhabitants of Nantz inſtantly eſpouſed her intereſts, and all the other fortreſſes of Brittany embraced the ſame reſolution. The king of England was appriſed of her efforts; and was intreated to ſend her ſuccours with all poſſible expedition to the town of Hennebone, in which place ſhe reſolved to ſuſtain the attacks of the enemy. Charles de Blois, Philip's general, anxious to make himſelf maſter of ſo important a fortreſs as Hennebone, and ſtill more to take the counteſs a priſoner, ſat down before the place with a large army, and conducted the ſiege with indefatigable induſtry. The defence was no leſs vigorous; ſeveral ſallies were made by the garriſon, in which the counteſs herſelf was ſtill the moſt active, and led on to the aſſault. Obſerving one day that their whole army had quitted the camp to join in a general ſtorm, ſhe ſallied out by a poſtern at the head of 300 horſe, ſet fire to the enemies tents and baggage, put their ſutlers and ſervants to the ſword, and occaſioned ſuch an alarm, that the French deſiſted from the aſſault, in order to cut off her communication with the town. Thus intercepted, ſhe retired to Auray, where ſhe continued five or ſix days; then returning at the head of 500 horſe, ſhe fought her way through one quarter of the French camp, and returned to her faithful citizens in triumph. But the beſiegers had at length made ſeveral breaches in the walls; and it was apprehended that a general aſſault, which was hourly expected, would be fatal. A capitulation was therefore propoſed, and a conference was already begun, when the counteſs, who had mounted on a high tower, and was looking towards the ſea with great impatience, deſcried ſome ſhips at a diſtance. She immediately exclaimed that ſuccours were arrived, and forbid any further capitulation. She was not diſappointed in her wiſhes; the fleet ſhe diſcerned carried a body of Engliſh gentlemen, with 6000 archers, whom Edward had prepared for the relief of Hennebone, but who had been long detained by contrary winds. They entered the harbour, under the conduct of Sir Walter Manny, one of the moſt valiant commanders of his time. This relief ſerved to keep up the declining ſpirits of the Bretons, until the time appointed by the late truce with Edward was expired, on which he was at liberty to renew the war in greater form.

He accordingly ſoon after landed at Morbian, near Vannes, with an army of 12,000 men; and being maſter of the field, where no enemy dared to appear againſt him, he endeavoured to give luſtre to his arms by beſieging ſome of the moſt capital of the enemy's fortifications. The vigour of his operations led on to another truce, and this was ſoon after followed by a freſh infraction. The truth is, neither ſide obſerved a truce longer than it coincided with their intereſts; and both had always ſufficient art to throw the blame of perfidy from themſelves. The earl of Derby was ſent by Edward to defend the province of Guienne, with inſtructions alſo to take every poſſible advantage that circumſtances might offer. At firſt, therefore, his ſucceſſes were rapid and brilliant; but as ſoon as the French king had time to prepare, he met with a very unexpected reſiſtance; ſo that the Engliſh general was compelled to ſtand upon the defenſive. One fortreſs after another was ſurrendered to the French; till at length nothing appeared but a total extinction of the power of England upon the continent. In this ſituation, Edward reſolved to bring relief in perſon to his diſtreſſed ſubjects and allies; and accordingly embarked in 1346 at Southampton, on board a fleet of near 1000 ſail, of all dimenſions. He carried with him, beſides all the chief nobility of England, his eldeſt ſon, the prince of Wales (afterwards ſurnamed the *Black Prince*); a youth of about 15 years old, and already remarkable both for underſtanding and valour above his age. His army conſiſted of 4000 men at arms, 10,000 archers, 10,000 Welſh infantry, and 6000 Iriſh; all which he landed ſafely at La Hogue, a port in Normandy, which country he determined to make the ſeat of the war.

40 He lands with an army in Normandy.

The intelligence of Edward's landing, and the devaſtation cauſed by his troops, who diſperſed themſelves over the whole face of the country, ſoon ſpread univerſal conſternation through the French court. The rich city of Caen was taken and plundered by the Engliſh, without mercy; the villages and towns, even up to Paris, ſhared the ſame fate; and the French had no other reſource but by breaking down their bridges, to attempt putting a ſtop to the invader's career. In the mean time, Philip was not idle in making preparations to repreſs the enemy. He had ſtationed one of his generals,

rals, Godemar de Faye, with an army on the oppoſite ſide of the river Somme, over which Edward was to paſs; while he himſelf, at the head of 100,000 fighting men, advanced to give the Engliſh battle. Edward, thus unexpectedly expoſed to the danger of being incloſed and ſtarved in an enemy's country, publiſhed a reward to any that ſhould bring him intelligence of a paſſage over the river Somme. This was diſcovered by a peaſant of the country; and Edward had juſt time to get his whole army over the river, when Philip appeared in his rear.

41 The battle of Crecy.

As both armies had been for ſome time in ſight of each other, nothing was ſo eagerly expected on each ſide as a battle: and although the forces were extremely diſproportioned, the Engliſh amounting only to 30,000, the French to 120,000; yet Edward reſolved to indulge the impetuoſity of his troops, and put all to the hazard of a battle. He accordingly choſe his ground, with advantage, near the village of Crecy; and there determined to wait with tranquillity the ſhock of the enemy. He drew up his men on a gentle aſcent, and divided them into three lines. The firſt was commanded by the young prince of Wales; the ſecond was conducted by the earls of Northampton and Arundel; and the third, which was kept as a body of reſerve, was headed by the king in perſon. As his ſmall army was in danger of being ſurrounded, he threw up trenches on his flank; and placed all his baggage in a wood behind him, which he alſo ſecured by an entrenchment. Having thus made the proper diſpoſitions, he and the prince of Wales received the ſacrament with great devotion; and all his behaviour denoted the calm intrepidity of a man reſolved on conqueſt or death. It is ſaid alſo by ſome, that he firſt made uſe of artillery upon this occaſion; and placed in his front ſome pieces, which contributed not a little to throw the enemy into diſorder.

On the other ſide, Philip, impelled by reſentment, and confident of his numbers, was more ſolicitous in bringing the enemy to an engagement, than prudent in taking meaſures for the ſucceſs of it. He was adviſed by ſome of his generals to defer the combat till the enſuing day, when his army would have recovered from their fatigue, and might be diſpoſed into better order than their preſent hurry permitted them to obſerve. But it was now too late; the impatience of his troops was too great to be reſtrained; they preſſed one upon the other, and no orders could curb their blind impetuoſity. They were led on, however, in three bodies to oppoſe thoſe of the Engliſh. The firſt line, conſiſting 15,000 Genoeſe croſs-bow men, were commanded by Anthony Doria. The ſecond body was led by the count Alençon, brother to the king; and the king himſelf was at the head of the third.

About three in the afternoon, the famous battle of Crecy began, by the French king's ordering the Genoeſe archers to charge; but they were ſo fatigued with their march, that they cried out for a little reſt before they ſhould engage. The count Alençon, being informed of their petition, rode up and reviled them as cowards, commanding them to begin the onſet without delay. Their reluctance to begin was ſtill more increaſed by an heavy ſhower which fell that inſtant and relaxed their bow-ſtrings, ſo that the diſcharge they made produced but very little effect. On the other hand, the Engliſh archers, who had kept their bows in caſes, and were favoured by a ſudden gleam of ſun-ſhine, that rather dazzled the enemy, let fly their arrows ſo thick, and with ſuch good aim, that nothing was to be ſeen among the Genoeſe but hurry, terror, and diſmay. The young prince of Wales had preſence of mind to take an advantage of their confuſion, and to lead on his line to the charge. The French cavalry, however, commanded by count Alençon, wheeling round, ſuſtained the combat, and began to hem the Engliſh round. The earls of Arundel and Northampton now came in to aſſiſt the prince, who appeared foremoſt in the very ſhock; and, wherever he appeared, turning the fortune of the day. The thickeſt of the battle was now gathered round him, and the valour of a boy filled even veterans with aſtoniſhment; but, being apprehenſive that ſome miſchance might happen to him in the end, an officer was diſpatched to the king, deſiring that ſuccours might be ſent to the prince's relief. Edward, who had all this time, with great tranquillity, viewed the engagement from a wind-mill, demanded with ſeeming deliberation if his ſon were dead: but being anſwered that he ſtill lived, and was giving aſtoniſhing inſtances of valour; "Then tell my generals, (cried the king), that he ſhall have no aſſiſtance from me; the honour of this day ſhall be his; let him ſhew himſelf worthy the profeſſion of arms, and let him be indebted to his own merit alone for victory." This ſpeech being reported to the prince and his attendants, it inſpired them with new courage: they made a freſh attack upon the French cavalry; and count Alençon, their braveſt commander, was ſlain. This was the beginning of their total overthrow: the French, being now without a competent leader, were thrown into confuſion; the Welſh infantry ruſhed into the midſt of the conflict, and diſpatched thoſe with their long knives who had ſurvived the fury of the former onſet. It was in vain that the king of France himſelf ſeemed almoſt ſingly to maintain the combat; he endeavoured to animate his few followers, both by his voice and example, but the victory was too deciſive to be reſiſted; while he was yet endeavouring to face the enemy, John de Hainault ſeized the reins of his horſe, and, turning him round, carried him off the field of battle. In this engagement, 30,000 of the French were killed upon the field: and, among this number, were John king of Bohemia; James, king of Majorca; Ralph, duke of Lorrain; 9 counts, 24 bannerets, 1200 knights, 1500 gentlemen, and 4000 men at arms. There was ſomething remarkable in the fate of the Bohemian king; who, though blind, was yet willing to ſhare in the engagement. This unfortunate monarch, inquiring the fate of the day, was told that all was loſt, and his ſon Charles obliged to retire deſperately wounded; and that the prince of Wales bore down every thing before him. Having received this information, blind as he was, he commanded his knights to lead him into the hotteſt part of the battle againſt the young warrior; accordingly, four of them ruſhed with him into the thickeſt part of the enemy, where they were all quickly ſlain.

41 French totally defeated.

The whole French army took to flight; and were put to the ſword by the purſuers without mercy, till night ſtopped the carnage. The next morning was foggy; and a party of the militia of Rouen coming to join the French army, were routed by the Engliſh at the firſt onſet; many more alſo were decoyed by ſome French ſtandards, which the victors placed upon the mountains, and to which the fugitives reſorted, where they were cut in pieces without mercy. Notwithſtanding the great ſlaughter of the enemy, the conquerors loſt but one eſquire, three knights, and a few of inferior rank. The creſt of the king of Bohemia was three oſtrich feathers, with this motto, *Ich Dien;* which ſignifies, in the German language, "I ſerve." This was thought to be a proper prize to perpetuate the victory; it was accordingly added to the arms of the prince of Wales, and it has been adopted by all his ſucceſſors.

43
Calais taken.

Edward next laid ſiege to Calais, which was then defended by John de Vienne, an experienced commander, and ſupplied with every thing neceſſary for defence. It was at length taken, after a twelvemonth's ſiege, the defendants having been reduced to the laſt extremity by famine and fatigue. The obſtinate reſiſtance, made by the townſmen, was not a little diſpleaſing to Edward; and he had often declared, that when put in poſſeſſion of the place, he would take ſignal revenge for the numbers of men he had loſt during the ſiege. It was with great difficulty, therefore, that he was perſuaded to accept of their ſubmiſſion; and to ſpare their lives, upon condition, that ſix of the moſt conſiderable citizens ſhould be ſent to him, to be diſpoſed of as he ſhould think proper: but on theſe he was reſolved to wreck his reſentment; and he gave orders that they ſhould be led into his camp, bare-headed and barefooted, with ropes about their necks, in the manner of criminals juſt preparing for inſtant execution. When the news of this fierce reſolution was brought into the city, it ſpread new conſternation among the inhabitants. Who ſhould be the men, that were thus to be offered up as victims to procure the ſafety of all the reſt, and by their deaths appeaſe the victor's reſentment? In this terrible ſuſpenſe, one of the principal inhabitants, whoſe name was *Euſtace de St Pierre,* walked forward, and offered himſelf as willing to undergo any tortures that could procure his fellow-citizens ſafety. Five more ſoon followed his noble example; and theſe, marching out like criminals, laid the keys of their city at Edward's feet: but no ſubmiſſions ſeemed to appeaſe his reſentment; and they would in all probability have ſuffered death, had not the generoſity of their conduct affected the queen, who interceded in their behalf, and with ſome difficulty obtained their pardon.

In 1350, a ſhort truce, which had been concluded between Edward and Philip, was diſſolved by the death of the latter, who was ſucceeded by his ſon John; and Edward, well pleaſed with the factions that then prevailed in France, was reſolved to ſeize the opportunity of increaſing its diſtreſſes. Accordingly, the Black Prince was ſent into France with an army, on board a fleet of 100 ſail; and landing in Gaſcony, carried his devaſtations into the heart of the country. At the ſame time, Edward himſelf made an irruption on the ſide of Calais, at the head of a numerous army, and ravaged all the open country. On the other hand, John, who was as yet unprepared to oppoſe the progreſs of the enemy, continued a ſpectator of their inſults; nor was it till the ſummer's campaign, in 1355, that he reſolved to attack the Black Prince, whoſe army was by this time reduced to a body of about 12,000 men. With ſuch a trifling complement of forces had this young warrior ventured to penetrate into the heart of France, with a deſign of joining the duke of Lancaſter in Guienne. But he ſoon found that his ſcheme was impracticable: the country before him was too well guarded to permit his advancing further; and all the bridges behind were broken down, which effectually barred a retreat. In this embarraſſing ſituation, his perplexity was increaſed, by being informed, that the king of France was actually marching at the head of 60,000 men to intercept him. He at firſt thought of retreating: but ſoon finding it impoſſible, he determined calmly to await the approach of the enemy; and, notwithſtanding the diſparity of forces, to commit all to the hazard of a battle.

44
Battle of Poictiers.

It was at a place called *Maupertuis,* near Poictiers, that both armies came in ſight of each other. The French king might very eaſily have ſtarved the Engliſh into any terms he thought proper to impoſe; but ſuch was the impatient valour of the French nobility, and ſuch their certainty of ſucceſs, that it might have been equally fatal to attempt repreſſing their ardour to engage. In the mean time, while both armies were drawn out, and expecting the ſignal to begin, they were ſtopped by the appearance of the cardinal of Perigord, who attempted to be a mediator between them. However, John, who made himſelf ſure of victory, would liſten to no other terms than the reſtitution of Calais; with which the Black Prince refuſing to comply, the onſet was deferred till the next morning, for which both ſides waited in anxious ſuſpence.

During this interval, the young prince ſtrengthened his poſt by new entrenchments; and placed 300 men in ambuſh, with as many archers, who were commanded to attack the enemy in flank during the heat of the engagement. Having taken theſe precautions, he ranged his army in three diviſions; the van was commanded by the earl of Warwick, the rear by the earls of Saliſbury and Suffolk, and the main body by himſelf. In like manner, the king of France arranged his forces in three diviſions; the firſt commanded by the duke of Orleans; the ſecond by the Dauphin, attended by his younger brothers; while he himſelf led up the main body, ſeconded by his youngeſt and favourite ſon, then about 14 years of age. As the Engliſh were to be attacked only by marching up a long narrow lane, the French ſuffered greatly from their archers, who were poſted on each ſide, behind the hedges. Nor were they in a better ſituation upon emerging from this danger, being met by the Black Prince himſelf, at the head of a choſen body of troops, who made a furious onſet upon their forces, already in great diſorder. A dreadful overthrow enſued: thoſe who were as yet in the lane recoiled upon their own forces; while the Engliſh troops who had been placed in ambuſh, took that opportunity to increaſe the confuſion, and confirm the victory. The dauphin and the duke of Orleans were among the firſt that fled. The king of France himſelf made the utmoſt efforts to retrieve, by his valour, what his raſhneſs had forfeited: but his ſingle courage was unable to ſtop that conſternation, which had now become general through his army; and his cavalry ſoon flying, he found himſelf expoſed to the enemy's fury.

45
French defeated.

At

46 King John taken priſoner.

At length, ſpent with fatigue, and deſpairing of ſucceſs, he thought of yielding himſelf a priſoner; and frequently cried out, that he was ready to deliver himſelf to his couſin the prince of Wales. The honour of taking him, however, was reſerved for a much more ignoble hand; he was ſeized by Dennis de Morbec, a knight of Arras, who had been obliged to fly his country for murder.

In April following, the prince conducted his royal priſoner through London, attended by an infinite concourſe of people of all ranks and ſtations. His modeſty upon this occaſion was very remarkable: the king of France was clad in royal apparel, and mounted on a white ſteed diſtinguiſhed by its ſize and beauty; while the prince himſelf rode by his ſide upon a mean little horſe, and in very plain attire.

47 Decline of the Engliſh affairs.

Notwithſtanding all this ſucceſs of the Engliſh, however, the conqueſt of France appeared very diſtant; nor could all the valour of the Black Prince afterwards accompliſh any thing of moment. The dauphin, being created regent of France, collected all his forces; and, by acting on the defenſive, prevented Edward from gaining any conſiderable advantage. All the conſiderable towns were put into a poſture of defence, and every thing valuable in the kingdom was ſecured in fortified places. It was therefore at laſt concluded, that king John ſhould be reſtored to liberty upon paying a ranſom of about a million and a half of our money. It was ſtipulated, that Edward ſhould for ever renounce all claim to the kingdom of France: and ſhould only remain poſſeſſed of the territories of Poictou, Xaintonge, l'Agenois, Perigord, the Limouſin, Quercy, Rouvergne, l'Angoumois, and other diſtricts in that quarter, together with Calais, Guiſnes, Montreuil, and the county of Ponthieu on the other ſide of France. Some other ſtipulations were made in favour of the allies of England, as a ſecurity for the execution of theſe conditions.

48 John, unable to pay his ranſom, returns to England.

Upon John's return to his dominions, he found himſelf very ill able to ratify thoſe terms of peace that had been juſt concluded. He was without finances, at the head of an exhauſted ſtate; his ſoldiers without diſcipline, and his peaſants without ſubordination. Theſe had riſen in great numbers; and one of the chiefs of their banditti aſſumed the title of *The Friend of God, and the Terror of Man.* A citizen of Sens, named *John Gouge*, alſo got himſelf, by means of his robberies, to be acknowledged king; and he ſoon cauſed as many calamities by his devaſtations, as the real king had brought on by his misfortunes. Such was the ſtate of that wretched kingdom, upon the return of its captive monarch: and yet, ſuch was his abſurdity, that he immediately prepared for a croiſade into the Holy Land, before he was well replaced on the throne. Had his exhauſted ſubjects been able to equip him for this chimerical project, it is probable he would have gone through with it; but their miſeries were ſuch, that they were even too poor to pay his ranſom. This was a breach of treaty that John would not ſubmit to; and he was heard to expreſs himſelf in a very noble manner upon the occaſion: "Tho' (ſays he) good faith ſhould be baniſhed from the reſt of the earth, yet ſhe ought ſtill to retain her habitation in the breaſt of kings." In conſequence of this declaration, he actually returned to England once more; and yielded himſelf a priſoner, ſince he could not be honourably free. It is ſaid by ſome, that his paſſion for the counteſs of Saliſbury was the real cauſe of his journey: but we want at this time the foundations for ſuch an injurious report. He was lodged in the Savoy, the palace where he had reſided during his captivity; and ſoon after he cloſed a long and unfortunate reign, by his death, which happened in the year 1384, about the 56th year of his age.

49 Dies, and is ſucceeded by Charles the Wiſe.

Charles, ſurnamed *the Wiſe*, ſucceeded his father on the throne of France; and this monarch, merely by the force of a finely conducted policy, and even tho' ſuffering ſome defeats, reſtored his country once more to tranquillity and power. He quelled and diſſipated a ſet of banditti, who had aſſociated themſelves under the name of *Companions*, and who had long been a terror to the peaceable inhabitants. He had them enrolled into a body, and led them into the kingdom of Caſtile againſt Peter, ſurnamed *the Cruel*, whom his ſubjects had dethroned, and who, by means of an alliance with the Engliſh, endeavoured to get himſelf reinſtated upon the throne. In conſequeuce of theſe alliances, the Engliſh and French again came to an engagement; their armies on the one ſide commanded by the Black Prince; on the other, by Henry of Tranſtamarre, and Bertrand du Gueſclin, one of the moſt conſummate generals and accompliſhed characters of the age in which he lived. However, the uſual good fortune of the Engliſh prince prevailed; the French loſt above 20,000 men, while only four knights and 40 private men on the ſide of the Engliſh were ſlain.

50 Bad ſucceſs of the Engliſh.

Nevertheleſs, theſe victories were attended with very few good effects. The Engliſh, by their frequent levies, had been quite exhauſted, and were unable to continue an army in the field. Charles, on the other hand, cautiouſly forbore coming to any deciſive engagement; but was contented to let his enemies waſte their ſtrength in attempts to plunder a fortified country. When they were retired, he then was ſure to ſally forth, and poſſeſs himſelf of ſuch places as they were not ſtrong enough to defend. He firſt fell upon Ponthieu; the citizens of Abbeville opened their gates to him; thoſe of St Valois, Rue, and Crotoy, imitated the example; and the whole country was, in a little time, reduced to total ſubmiſſion. The ſouthern provinces were, in the ſame manner, invaded by his generals with equal ſucceſs: while the Black Prince, deſtitute of ſupplies from England, and waſted by a cruel and conſumptive diſorder, was obliged to return to his native country, leaving his affairs in the ſouth of France in a deſperate condition.

In this exigence, the reſentment of the king of England was excited to the utmoſt pitch; and he ſeemed reſolved to take ſignal vengeance on his enemies of the continent. But the fortunate occaſion was now elapſed; and all his ſucceeding deſigns were marked with ill ſucceſs. The earl of Pembroke, and his whole army, were intercepted at ſea, and taken priſoners by Henry king of Caſtile. Sir Robert Knolles, one of his generals on the continent, at the head of 30,000 men, was defeated by Bertrand du Gueſclin; while the duke of Lancaſter, at the head of 25,000 men, had the mortification of ſeeing his troops diminiſhed one half by flying parties, without ever coming to a battle.

At laſt, the Engliſh affairs were totally ruined by the death of the Black Prince and king Edward. On receiving this news, the armies of Charles attacked the Engliſh on all ſides. One, under the command of the duke of Burgundy, entered Artois; another entered Auvergne, under the command of the duke of Berry; that which acted in Guienne was commanded by the duke of Anjou; and the forces in Bretagne were under the conſtable Gueſclin: the king himſelf had a powerful body of troops, that he might be able to repair any accident which ſhould happen through the chance of war. The conſtable joined the duke of Burgundy, who found it difficult to oppoſe Sir Thomas Felton and the Seneſchal of Bourdeaux. Soon after his arrival, the conſtable attacked and defeated them, making both the commanders priſoners of war. This victory was ſo well purſued, that, at the cloſe of the campaign 1377, Bayonne and Bourdeaux, with the diſtricts about them, and the fortreſs of Calais with its dependencies, were all the places left to England on the continent.

51 Charles VI.

In 1379 the king died; and was ſucceeded by his ſon Charles VI. at that time 12 years old. During his minority, the public affairs fell into confuſion, and the people were plundered by the nobility with impunity. In 1385, a prodigious armament was fitted out againſt England. A vaſt fleet was aſſembled in the harbour of Sluys, and a very numerous army in the neighbourhood. According to ſome writers, the armament conſiſted of 1200 ſhips, 20,000 foot differently armed, 20,000 cavalry, and 20,000 croſs-bow men. There was beſides a vaſt wooden edifice or floating-town, which was contrived for the protection of the ſoldiers when landed: but all theſe preparations were at laſt brought to nothing through the obſtinacy of the duke of Berry; who, having been originally againſt this meaſure, carried on his part of the armament ſo ſlowly, that he did not arrive at Sluys till the middle of September, when the ſeaſon was ſo far advanced, that no invaſion was practicable. A ſtorm that happened ſoon after, drove the greateſt part of the fleet on ſhore, and beat the wooden edifice all to pieces; the remains of which the king beſtowed on the duke of Burgundy, to whom he gave alſo the port of Sluys, which was then very commodious, and of the utmoſt importance.

In 1391, one P. Craon attempted to aſſaſſinate the new conſtable de Cliſſon; and, (after having, with a band of ruffians, given him 50 wounds, of all which, however, he recovered), fled to Bretagne, where he was protected by the duke of that country. The king demanded the aſſaſſin to be given up to him in chains; but the duke anſwered, that he knew nothing of him: to which the king giving no credit, marched with all his forces into his territories. When the army arrived at Mans, the king was ſeized with a ſlow fever; but could not be prevailed upon to reſt or take phyſic.

52 Is ſeized with lunatic fits.

On the 5th of Auguſt, having marched all day in the heat of the ſun, a miſerable, ragged, wild-looking fellow darted from behind a tree, and laying hold of the bridle of his horſe, cried out, "Stop! where are you going, king? You are betrayed;" and immediately withdrew again into the wood. The king paſſed on, not a little diſturbed; and ſoon after one of the pages, who rode behind and carried his lance, overcome with heat, fell aſleep, and let it fall upon the helmet which was carried by the other. The king, hearing the noiſe, looked about; and perceiving the page lifting the lance, killed him immediately: then riding furiouſly with his ſword drawn, he ſtruck on every ſide of him, and at every perſon, till he broke his ſword; upon which one of his gentlemen leaped up behind him and held his arm. He fell ſoon after, and lay as if he had been dead; ſo that being taken up and bound in a waggon, he was carried back to Mans, where he lay two days in a lethargy, after which he came a little to himſelf. From this time the king continued frantic at intervals, which gave occaſion to the greateſt diſorders throughout the kingdom. The adminiſtration of affairs was diſputed between his brother Lewis duke of Orleans, and his couſin-german John duke of Burgundy. Iſabella, his queen, alſo had her party; and the king vainly attempted to ſecure one likewiſe in his favour. Each of theſe, as they happened to prevail, branded their captives with the name of *traitors*; and the gibbets were at once hung with the bodies of the accuſed and the accuſers. This, therefore, was thought by Henry V. of England a favourable opportunity to recover from France thoſe grants that had been formerly given up by treaty. But previouſly, to give his intended expedition the appearance of juſtice, he ſent over ambaſſadors to Paris, offering a perpetual peace and alliance, on condition of being put in poſſeſſion of all thoſe provinces which had been raviſhed from the Engliſh during ſome former reigns, and of eſpouſing Catharine, the French king's daughter, in marriage, with a ſuitable dowry. Though the French court was at that time extremely averſe to war, yet the exorbitance of theſe demands could not be complied with; and Henry very probably made them in hopes of a denial.

53 Invaſion by Henry V. of England.

He therefore aſſembled a great fleet and army at Southampton; and having allured all the military men of the kingdom to attend him, from the hopes of conqueſt, he put to ſea, and landed at Harfleur, at the head of an army of 6000 men at arms, and 24,000 foot, moſtly archers.

His firſt operations were upon Harfleur; which being preſſed hard, promiſed at a certain day to ſurrender, unleſs relieved before that time. The day arriving, and the garriſon, unmindful of their engagement, ſtill reſolving to defend the place, Henry ordered an aſſault to be made, took the town by ſtorm, and put all the garriſon to the ſword. From thence, the victor advanced farther into the country, which had been already rendered deſolate by factions, and which he now totally laid waſte. But although the enemy made a feeble reſiſtance, yet the climate ſeemed to fight againſt the Engliſh; a contagious dyſentery carrying off three parts of Henry's army. In this ſituation he had recourſe to an expedient common enough in that barbarous age, to inſpire his troops with confidence in their general. He challenged the dauphin, who commanded in the French army, to ſingle combat, offering to ſtake his pretenſions on the event. This challenge, as might naturally be expected, was rejected; and the French, though diſagreeing internally, at laſt ſeemed to unite, at the appearance of the common danger. A numerous army of 14,000 men at arms, and 40,000 foot, was by this time aſſembled under the command of count Albert, and was now placed to intercept Henry's weakened forces on their return. The Engliſh monarch, when it was too late, began to repent of his raſh inroad into a country, where diſeaſe and a powerful army every where threatened deſtruction; he therefore thought of retiring into Calais. In this retreat, which was at once both painful and dangerous, Henry took every precaution to inſpire his troops with patience and perſeverance; and ſhewed them in his own perſon the brighteſt example of fortitude and reſignation. He was continually harraſſed on his march by flying parties of the enemy; and whenever he attempted to paſs the river Somme, acroſs which his march lay, he ſaw troops on the other ſide ready to oppoſe his paſſage. However, he was ſo fortunate as to ſeize by ſurpriſe a paſſage near St Quintin, which had not been ſufficiently guarded; and there he ſafely carried over his army.

54 Battle of Azincourt.

But the enemy was ſtill reſolved to intercept his retreat: and after he had paſſed the ſmall river of Tertrois at Blangi, he was ſurpriſed to obſerve from the heights the whole French army drawn up in the plains of Azincourt; and ſo poſted, that it was impoſſible for him to proceed on his march, without coming to an engagement. No ſituation could be more unfavourable than that in which he then found himſelf. His army was waſted by diſeaſe; the ſoldiers ſpirits worn down with fatigue; deſtitute of proviſions, and diſcouraged by their retreat. Their whole body amounted but to 9000 men; and theſe were to ſuſtain the ſhock of an enemy near ten times their number, headed by expert generals, and plentifully ſupplied with proviſions. This diſparity, as it depreſſed the Engliſh, ſo it raiſed the courage of the French in proportion; and ſo confident were theſe of ſucceſs, that they began to treat for the ranſom of their priſoners. Henry, on the other hand, though ſenſible of his extreme danger, did not omit any circumſtance that could aſſiſt his ſituation. As the enemy were ſo much ſuperior, he drew up his army on a narrow ground between two woods, which guarded each flank; and patiently expected, in that poſition, the attack of the enemy. The conſtable of France was at the head of one army; and Henry himſelf, with Edward duke of York, commanded the other. For a time both armies, as if afraid to begin, kept ſilently gazing at each other, neither being willing to break their ranks by making the onſet: which Henry perceiving, with a cheerful countenance he cried out, "My friends, ſince they will not begin, it is ours to ſet them the example; come on, and the Bleſſed Trinity be our protection." Upon this, the whole army ſet forward with a ſhout, while the French ſtill continued to wait their approach with intrepidity. The Engliſh archers, who had long been famous for their great ſkill, firſt let fly a ſhower of arrows three feet long, which did great execution. The French cavalry advancing to repel theſe, 200 bow-men, who lay till then concealed, riſing on a ſudden, let fly among them, and produced ſuch a confuſion, that the archers threw by their arrows, and, ruſhing in, fell upon them ſword in hand. The French at firſt repulſed the aſſailants, who were enfeebled by diſeaſe: but theſe ſoon made up the defect by their valour; and, reſolving to conquer or die, burſt in upon the enemy with ſuch impetuoſity, that the French were obliged to give way.

In the mean time a body of Engliſh horſe, which had been concealed in a neighbouring wood, ruſhing out, flanked the French infantry, and a general diſorder began to enſue. The firſt line of the enemy being routed, the ſecond line began to march up to interrupt the progreſs of the victory. Henry, therefore, alighting from his horſe, preſented himſelf to the enemy with an undaunted countenance; and at the head of his men fought on foot, encouraging ſome and aſſiſting others. Eighteen French cavaliers, who were reſolved to kill him, or die in the attempt, ruſhing from the ranks together, advanced; and one of them ſtunned the king with a blow of his battle-ax. They then fell upon him in a body; and he was upon the point of ſinking under their blows, when David Gam, a valiant Welſhman, aided by two of his countrymen, came up to the king's aſſiſtance, and ſoon turned the attention of the aſſailants from the king to themſelves, till at length, being overpowered, they fell dead at his feet. Henry had by this time recovered his ſenſes; and freſh troops advancing to his relief, the 18 French cavaliers were ſlain; upon which he knighted the Welchmen who had ſo valiantly fallen in his defence. The heat of the engagement ſtill increaſing, Henry's courage ſeemed alſo to increaſe; and the moſt dangerous ſituation was where he fought in perſon: his brother, who was ſtunned by a blow, fell at his feet; and while the king was endeavouring to ſuccour him, he received another blow himſelf, which threw him upon his knees. But he ſoon recovered: and leading on his troops with freſh ardour, they ran headlong upon the enemy; and put them into ſuch diſorder, that their leaders could never after bring them to the charge. The duke of Alençon, who commanded the ſecond line, ſeeing it fly, reſolved by one deſperate ſtroke to retrieve the fortune of the day, or fall in the attempt. Wherefore, running up to Henry, and at the ſame time crying aloud, "that he was the duke of Alençon," he diſcharged ſuch a blow on his head, that it carried off a part of the king's helmet; while, in the mean time, Henry, not having been able to ward off the blow, returned it, by ſtriking the duke to the ground, and he was ſoon killed by the ſurrounding crowd, all the king's efforts to ſave him proving ineffectual. In this manner, the French were overthrown in every part of the field; their number, being crowded into a very narrow ſpace, were incapable of either flying, or making any reſiſtance; ſo that they covered the ground with heaps of ſlain. 55 French defeated. After all appearance of oppoſition was over, the Engliſh had leiſure to make priſoners; and having advanced with uninterrupted ſucceſs to the open plain, they there ſaw the remains of the French rear-guard, which ſtill maintained a ſhew of oppoſition. At the ſame time was heard an alarm from behind, which proceeded from a number of peaſants, who had fallen upon the Engliſh baggage, and were putting thoſe who guarded it to the ſword. Henry, now ſeeing the enemy on all ſides of him, began to entertain apprehenſions from his priſoners, the number of whom exceeded even that of his army. He thought it neceſſary, therefore, to iſſue general orders for putting them to death; but on the diſcovery of the certainty of his victory, he ſtopped the ſlaughter, and was ſtill able to ſave a great number.

This battle was very fatal to France, from the number of princes and nobility ſlain or taken priſoners. The killed are computed on the whole to have amounted to 10,000 men; and as the loſs fell chiefly upon the ca-

cavalry, it is pretended, that of theſe 8000 were gentlemen. The number of priſoners are computed at 14,000. All the Engliſh who were ſlain did not exceed 40; a number amazingly inconſiderable, if we compare the loſs with the victory.

This victory, gained on the 25th of October 1415, how great ſoever it might have been, was attended with no immediate effects. Henry ſtill continued to retreat after the battle of Azincourt, out of the kingdom; and carried his priſoners to Calais, and from thence to England. In 1517, he once more landed an army of 25,000 men in Normandy; and prepared to ſtrike a deciſive blow for the crown of France, to which the Engliſh monarchs had long made pretenſions. That wretched country was now in a moſt deplorable ſituation. The whole kingdom appeared as one vaſt theatre of crimes, murders, injuſtice, and devaſtation. The duke of Orleans was aſſaſſinated by the duke of Burgundy; and the duke of Burgundy, in his turn, fell by the treachery of the dauphin. At the ſame time, the duke's ſon, deſirous of revenging his father's death, entered into a ſecret treaty with the Engliſh; and a league was immediately concluded at Arras, between Henry and the young duke of Burgundy, in which the king promiſed to revenge the murder of the late duke; and the ſon ſeemed to inſiſt upon no further ſtipulations. Henry, therefore, proceeded in his conqueſts, without much oppoſition from any quarter. Several towns and provinces ſubmitted on his approach; the city of Rouen was beſieged and taken; Pontoiſe and Giſors he ſoon became maſter of. He even threatened Paris by the terror of his power, and obliged the court to remove to Troye. It was at this city that the duke of Burgundy, who had taken upon him the protection of the French king, met Henry in order to ratify that treaty which was formerly begun, and by which the crown of France was to be transferred to a ſtranger. The imbecillity into which Charles had fallen, made him paſſive in this remarkable treaty; and Henry dictated the terms throughout the whole negotiation. The principal articles of this treaty were, That Henry ſhould eſpouſe the princeſs Catharine; that king Charles ſhould enjoy the title and dignity of king for life; but that Henry ſhould be declared heir to the crown, and ſhould be intruſted with the preſent adminiſtration of the government; that France and England ſhould for ever be united under one king, but ſhould ſtill retain their reſpective laws and privileges; that Henry ſhould unite his arms with thoſe of king Charles and the duke of Burgundy, to depreſs and ſubdue the dauphin and his partizans.

56
Henry lands again in Normandy.

57
He marries the princeſs Catharine.

It was not long after this treaty, that Henry married the princeſs Catharine; after which he carried his father-in-law to Paris, and took a formal poſſeſſion of that capital. There he obtained, from the eſtates of the kingdom, a ratification of the late compact; and then turned his arms, with ſucceſs, againſt the adherents of the dauphin, who, in the mean time, wandered about a ſtranger in his own patrimony, and to his enemies ſucceſſes only oppoſed fruitleſs expoſtulations.

Henry's ſupplies were not provided in ſuch plenty as to enable him to carry on the war, without returning in perſon to prevail upon his parliament for freſh ſuccours; and, upon his arrival in England, though he found his ſubjects highly pleaſed with the ſplendor of his conqueſts, yet they ſeemed ſomewhat doubtful as to the advantage of them. A treaty, which in its conſequences was likely to transfer the ſeat of empire from England, was not much reliſhed by the parliament. They therefore, upon various pretences, refuſed him a ſupply equal to his exigencies or his demands: but he was reſolved on purſuing his ſchemes; and, joining to the ſupplies granted at home, the contributions levied on the conquered provinces, he was able once more to aſſemble an army of 28,000 men, and with theſe he landed ſafely at Calais.

In the mean time, the dauphin, a prince of great prudence and activity, omitted no opportunity of repairing his ruined ſituation, and to take the advantage of Henry's abſence from France. He prevailed upon the regent of Scotland to ſend him a body of 8000 men from that kingdom; and with theſe, and ſome few forces of his own, he attacked the duke of Clarence, who commanded the troops in Henry's abſence, and gained a complete victory.

This was the firſt action which turned the tide of ſucceſs againſt the Engliſh. But it was of ſhort duration: for Henry ſoon after appearing with a conſiderable army, the dauphin fled at his approach; while many of the places, which held out for the dauphin in the neighbourhood of Paris, ſurrendered to the conqueror. In this manner, while Henry was every where victorious, he fixed his reſidence at Paris; and while Charles had a ſmall court, he was attended with a very magnificent one. On Whitſunday 1421, the two kings and their two queens with crowns on their heads dined together in public; Charles receiving apparent homage, but Henry commanding with abſolute authority.

In the mean time, the dauphin was chaſed beyond the Loire, and almoſt totally diſpoſſeſſed of all the northern provinces. He was even purſued into the ſouth, by the united arms of the Engliſh and Burgundians, and threatened with total deſtruction. In this exigence, he found it neceſſary to ſpin out the war, and to evade all hazardous actions with a rival who had been long accuſtomed to victory. His prudence was every where remarkable; and, after a train of long perſecutions from fortune, he found her at length willing to declare in his favour, by the death of the king of England.

58
Death of Henry and Charles.

Charles VI. died a ſhort time after; and Charles VII. ſucceeded his father to a nominal throne. Nothing could be more deplorable than the ſituation of that monarch on aſſuming his title to the crown. The Engliſh were maſters of almoſt all France; and Henry VI. though yet but an infant, was ſolemnly inveſted with regal power by legates from Paris. The duke of Bedford was at the head of a numerous army, in the heart of the kingdom, ready to oppoſe every inſurrection; while the duke of Burgundy, who had entered into a firm confederacy with him, ſtill remained ſtedfaſt, and ſeconded his claims. Yet, notwithſtanding theſe favourable appearances, Charles found means to break the leagues formed againſt him, and to bring back his ſubjects to their natural intereſts and their duty.

59
Deſperate ſituation of Charles VII.

However, his firſt attempts were totally deſtitute of ſucceſs. Wherever he endeavoured to face the enemy he was overthrown, and he could ſcarcely rely on the friends next his perſon. His authority was inſulted even by his own ſervants; advantage after advantage was gained againſt him; and a battle fought near Verneuil, in which he was totally defeated by the duke of Bedford, ſeemed to render his affairs altogether deſperate. But from the impoſſibility of the Engliſh keeping the field without new ſupplies, Bedford was obliged to retire into England; and, in the mean time, his vigilant enemy began to recover from his late conſternation. Dumois, one of his generals, at the head of 1000 men, compelled the earl of Warwick to raiſe the ſiege of Montargis; and this advantage, ſlight as it was, began to make the French ſuppoſe that the Engliſh were not invincible.

60 The French affairs retrieved by the Maid of Orleans.

But they ſoon had ſtill greater reaſon to triumph in their change of fortune, and a new revolution was produced by means apparently the moſt unlikely to be attended with ſucceſs. In the village of Domremi, near Vaucouleurs, on the borders of Lorrain, there lived a country-girl, abour 27 years of age, called *Joan of Arc*. This girl had been a ſervant at a ſmall inn; and in that humble ſtation had ſubmitted to thoſe hardy employments which fit the body for the fatigues of war. She was of an irreproachable life, and had hitherto teſtified none of thoſe enterprizing qualities which diſplayed themſelves ſoon after. She contentedly fulfilled the duties of her ſituation, and was remarkable only for her modeſty and love of religion. But the miſeries of her country ſeemed to have been one of the greateſt objects of her compaſſion and regard. Her mind inflamed by theſe objects, and brooding with melancholy ſtedfaſtneſs upon them, began to feel ſeveral impulſes, which ſhe was willing to miſtake for the inſpirations of heaven. Convinced of the reality of her own admonitions, ſhe had recourſe to one Baudricourt, governor of Vaucouleurs, and informed him of her deſtination by heaven to free her native country of its fierce invaders. Baudricourt treated her at firſt with neglect: but her importunities at length prevailed; and willing to make a trial of her pretenſions, he gave her ſome attendants, who conducted her to the court, which at that time reſided at Chinon.

The French court were probably ſenſible of the weakneſs of her pretenſions; but they were willing to make uſe of every artifice to ſupport their declining fortunes. It was therefore given out, that Joan was actually inſpired; that ſhe had been able to diſcover the king among the number of his courtiers, although he had laid aſide all the diſtinctions of his authority; that ſhe had told him ſome ſecrets, which were only known to himſelf; and that ſhe had demanded, and minutely deſcribed, a ſword in the church of St Catharine de Fierbois, which ſhe had never ſeen. In this manner, the minds of the vulgar being prepared for her appearance, ſhe was armed cap-à-pee, and ſhown in that martial dreſs to the people. She was then brought before the doctors of the univerſity; and they, tinctured with the credulity of the times, or willing to ſecond the impoſture, declared that ſhe had actually received her commiſſion from above.

When the preparations for her miſſion were completely blazoned, the next aim was to ſend her againſt the enemy. The Engliſh were at that time beſieging the city of Orleans, the laſt reſource of Charles, and every thing promiſed them a ſpeedy ſurrender. Joan undertook to raiſe the ſiege; and to render herſelf ſtill more remarkable, girded herſelf with the miraculous ſword, of which ſhe before had ſuch extaordinary notices. Thus equipped, ſhe ordered all the ſoldiers to confeſs themſelves before they ſet out; ſhe diſplayed in her hand a conſecrated banner, and aſſured the troops of certain ſucceſs. Such confidence on her ſide ſoon raiſed the ſpirits of the French army; and even the Engliſh, who pretended to deſpiſe her efforts, felt themſelves ſecretly influenced with the terrors of her miſſion. A ſupply of proviſions was to be conveyed into the town; Joan, at the head of ſome French troops, covered the embarkation, and entered Orleans at the head of the convoy which ſhe had ſafely protected. While ſhe was leading her troops along, a dead ſilence and aſtoniſhment reigned among the Engliſh; and they regarded with religious awe that temerity, which they thought nothing but ſupernatural aſſiſtance could inſpire. But they were ſoon rouzed from their ſtate of amazement by a ſally from the town; Joan led on the beſieged, bearing the ſacred ſtandard in her hand, encouraging them with her words and actions, bringing them to the trenches, and overpowering the beſiegers in their own redoubts. In the attack of one of the forts, ſhe was wounded in the neck with an arrow; but inſtantly pulling out the weapon with her own hands, and getting the wound quickly dreſſed, ſhe haſtened back to head the troops, and to plant her victorious banner on the ramparts of the enemy. Theſe ſucceſſes continuing, the Engliſh found that it was impoſſible to reſiſt troops animated by ſuch ſuperior energy; and Suffolk, who conducted the attack, thinking that it might prove extremely dangerous to remain any longer in the preſence of ſuch a courageous and victorious enemy, raiſed the ſiege, and retreated with all imaginable precaution.

From being attacked, the French now in turn became the aggreſſors. Charles formed a body of 6000 men, and ſent them to beſiege Jergeau, whither the Engliſh, commanded by the earl of Suffolk, had retired, with a detachment of his army. The city was taken; Suffolk yielded himſelf a priſoner; and Joan marched into the place in triumph, at the head of the army. A battle was ſoon after fought near Patay, where the Engliſh were worſted, as before; and the generals, Scales and Talbot, were taken priſoners.

The raiſing of the ſiege of Orleans was one part of the maid's promiſe to the king of France; the crowning him at Rheims was the other. She now declared, that it was time to complete that ceremony; and Charles, in purſuance of her advice, ſet out for Rheims at the head of 12,000 men. The towns thro' which he paſſed opened their gates to receive him; and Rheims ſent him a deputation, with its keys, upon his approach. The ceremony of his coronation was there performed with the utmoſt ſolemnity; and the Maid of Orleans (for ſo ſhe was now called) ſeeing the completion of her miſſion, deſired leave to retire, alleging, that ſhe had now accompliſhed the end of her calling. But her ſervices had been ſo great, that the king could not think of parting with her; he preſſed her to ſtay ſo earneſtly, that ſhe at length complied with his requeſt.

A tide of ſucceſſes followed the performance of this ſolemnity; Laon, Soiſſons, Chateau-Thierri, Provins,

vins, and many other fortreſſes in that neighbourhood, ſubmitted to him on the firſt ſummons. On the other hand, the Engliſh, diſcomfited and diſpirited, fled on every quarter; not knowing whether to aſcribe their misfortunes to the power of ſorcery, or to a celeſtial influence; but equally terrified at either. They now found themſelves deprived of the conqueſts they had gained, in the ſame manner as the French had formerly ſubmitted to their power. Their own diviſions, both abroad and at home, unfitted them entirely for carrying on the war; and the duke of Bedford, notwithſtanding all his prudence, ſaw himſelf diveſted of his ſtrong-holds in the country, without being able to ſtop the enemy's progreſs. In order, therefore, to revive the declining ſtate of his affairs, he reſolved to have Henry crowned king at Paris, knowing that the natives would be allured to obedience by the ſplendor of the ceremony. In 1430, Henry was accordingly crowned, all the vaſſals that ſtill continued under the Engliſh power ſwearing fealty and homage. But it was now too late for the ceremonies of a coronation to give a turn to the affairs of the Engliſh; the generality of the kingdom had declared againſt them, and the remainder only waited a convenient opportunity to follow the example.

61
Henry VI. of England crowned king of France.

An accident enſued ſoon after, which, though it promiſed to promote the Engliſh cauſe in France, in the end ſerved to render it odious, and conduced to the total evacuation of that country. The duke of Burgundy, at the head of a powerful army, had laid ſiege to Compeign; and the Maid of Orleans had thrown herſelf into the place, contrary to the wiſhes of the governor, who did not deſire the company of one whoſe authority would be greater than his own. The garriſon, however, were rejoiced at her appearance, and believed themſelves invincible under her protection. But their joy was of ſhort duration; for Joan having the day after her arrival headed a ſally, and twice driven the enemy from their intrenchments, ſhe was at laſt obliged to retire, placing herſelf in the rear, to protect the retreat of her forces. But in the end, attempting to follow her troops into the city, ſhe found the gates ſhut, and the bridge drawn up by order of the governor, who is ſaid to have long wiſhed for an opportunity of delivering her up to the enemy.

62
Maid of Orleans taken priſoner.

Nothing could exceed the joy of the beſiegers, in having taken a perſon who had been ſo long a terror to their arms. The ſervice of Te Deum was publicly celebrated on this occaſion; and it was hoped, that the capture of this extraordinary perſon would reſtore the Engliſh to their former victories and ſucceſſes. The duke of Bedford was no ſooner informed of her being taken, than he purchaſed her of the count Vendome, who had made her his priſoner, and ordered her to be committed to cloſe confinement. The credulity of both nations was at that time ſo great, that nothing was too abſurd to gain belief, that coincided with their paſſions. As Joan but a little before, from her ſucceſſes, was regarded as a ſaint, ſhe was now, upon her captivity, conſidered as a ſorcereſs, forſaken by the dæmon who had granted her a fallacious and temporary aſſiſtance. Accordingly it was reſolved in council to ſend her to Rouen to be tried for witchcraft: and the biſhop of Beauvais, a man wholly devoted to the Engliſh intereſt, preſented a petition againſt her for that purpoſe. The univerſity of Paris was ſo mean as to join in the ſame requeſt. Several prelates, among whom the cardinal of Wincheſter was the only Engliſhman, were appointed as her judges. They held their court in Rouen, where Henry then reſided; and the Maid, clothed in her former military apparel, but loaded with irons, was produced before this tribunal. Her behaviour there noway diſgraced her former gallantry; ſhe betrayed neither weakneſs nor womaniſh ſubmiſſion; but appealed to God and the pope for the truth of her former revelations. In the iſſue, ſhe was found guilty of hereſy and witchcraft; and ſentenced to be burnt alive, the common puniſhment for ſuch offences.

But previous to the infliction of this dreadful ſentence upon her, they were reſolved to make her abjure her former errors; and at length ſo far prevailed upon her, by terror and rigorous treatment, that her ſpirits were entirely broken, by the hardſhips ſhe was obliged to ſuffer. Her former viſionary dreams began to vaniſh, and a gloomy diſtruſt to take place of her late inſpirations. She publicly declared herſelf willing to recant, and promiſed never more to give way to the vain deluſions which had hitherto miſled her, and impoſed on the people. This was what her oppreſſors deſired; and willing to ſhew ſome appearance of mercy, they changed her ſentence into perpetual impriſonment, and to be fed during life on bread and water. But the rage of her enemies was not yet ſatiated. Suſpecting that the female dreſs, which ſhe had conſented to wear, was diſagreeable to her, they purpoſely placed in her apartment a ſuit of mens apparel, and watched for the effect of their temptation upon her. Their cruel artifices prevailed. Joan, ſtruck with the ſight of a dreſs in which ſhe had gained ſo much glory, immediately threw off her penitent's robes, and put on the forbidden garment. Her enemies caught her equipped in this manner; and her imprudence was conſidered as a relapſe into her former tranſgreſſions. No recantation would ſuffice, and no pardon would be granted. She was condemned to be burnt alive in the market-place of Rouen; and this infamous ſentence was accordingly executed with moſt brutal ſeverity.

63
And cruelly put to death.

One of the firſt misfortunes which the Engliſh felt after this puniſhment, was the defection of the duke of Burgundy; who had for ſome time ſeen the error of his conduct, and wiſhed to break an unnatural connection, that only ſerved to involve his country in ruin. A treaty was therefore begun, and concluded, between him and Charles, in which the former agreed to aſſiſt him in driving the Engliſh out of France. This was a mortal blow to their cauſe; and ſuch was its effects upon the populace of London, when they were informed of it, that they killed ſeveral of the duke of Burgundy's ſubjects, who happened to be among them at the time. It might perhaps alſo have haſtened the duke of Bedford's death, who died at Rouen a few days after the treaty was concluded; and the earl of Cambridge was appointed his ſucceſſor to the regency of France.

From this period, the Engliſh affairs became totally irretrievable. The city of Paris returned once more to a ſenſe of its duty. Lord Willoughby, who commanded it for the Engliſh, was contented to ſtipulate

64
Affairs of Engliſh totally ruined.

for the ſafe retreat of his troops to Normandy. Thus ground was continually, though ſlowly, gained by the French; and notwithſtanding their fields were laid waſte, and their towns depopulated, yet they found protection from the weakneſs and diviſions of the Engliſh. At length, both parties began to grow weary of a war, which, though carried on but feebly, was yet a burden greater than either could ſupport. But the terms of peace inſiſted upon by both were ſo wide of each other, that no hopes of an accommodation could quickly be expected. A truce, therefore, for twenty-two months, was concluded in 1443, which left every thing on the preſent footing between the parties. No ſooner was this agreed upon, than Charles employed himſelf with great induſtry and judgment in repairing thoſe numberleſs ills to which his kingdom, from the continuance of wars, both foreign and domeſtic, had ſo long been expoſed. He eſtabliſhed diſcipline among his troops, and juſtice among his governors. He revived agriculture, and repreſſed faction. Thus being prepared once more for taking the field, he took the firſt favourable occaſion of breaking the truce; and Normandy was at the ſame time invaded by four powerful armies; one commanded by Charles himſelf, a ſecond by the duke of Brittany, a third by the count of Alençon, and a fourth by the count Dunois. Every place opened their gates almoſt as ſoon as the French appeared before them. Rouen was the only one that promiſed to hold out a ſiege; but the inhabitants clamoured ſo loud for a ſurrender, that the duke of Somerſet, who commanded the garriſon, was obliged to capitulate. The battle, or rather the ſkirmiſh, of Fourmingi, was the laſt ſtand which the Engliſh made in defence of their French dominions. However, they were put to the rout, and above a thouſand were ſlain. All Normandy and Guienne, that had ſo long acknowledged ſubjection to England, were loſt in the ſpace of a year; and the Engliſh ſaw themſelves entirely diſpoſſeſſed of a country, which for above three centuries they had conſidered as annexed to their native dominions. Calais alone remained of all their conqueſts; and this was but a ſmall compenſation for the blood and treaſure which had been laviſhed in that country, and only ſerved to gratify ambition with a tranſient applauſe.

65
Death of Charles VII.

Charles having thus expelled the Engliſh, found himſelf involved in domeſtic troubles. His ſon Lewis rebelled againſt him, and neither the king's valour nor wiſdom were ſufficient to bring him back to a ſenſe of his duty. The king died in 1461, of a very ſtrange diſorder. One of his old ſervants intimated to him that he would do well to be cautious, ſince there was reaſon to ſuſpect a deſign to poiſon him: which affected the king to ſuch a degree, that he obſtinately refuſed all ſuſtenance for ſeveral days; and being at length perſuaded to eat, it proved too late, for his bowels were collapſed, and nothing would paſs. He died on the 22d of July 1461, in the 60th year of his age, and 39th of his reign.

66
Lewis XI.

Lewis XI. who ſucceeded his father Charles, was reckoned one of the greateſt politicians that ever exiſted. He managed all his affairs with his neighbours, indeed, in ſuch a manner as always to have the advantage over them, though this was often very much to the detriment of his moral character. He united to the crown of France, Burgundy, Anjou, Maine, Bar, and Provence, the beſt part of the county of Artois, and ſome great towns in Picardy; together with the counties of Rouſillon, Cerdagne, and Boulogne. He firſt uſed the title of *Moſt Chriſtian King* conſtantly, which has ſince paſſed to his ſucceſſors; and he ſeems likewiſe to have been the firſt French monarch treated with the title of *Majeſty*, in addreſſes to him from foreigners, as well as from his own ſubjects. He died in 1483, in the 61ſt year of his age, and 23d of his reign.

67
Charles VIII.

His ſucceſſor Charles VIII. conquered Bretagne in the year 1489. The duke of this country was in alliance with Henry VII. of England. It was the intereſt of this monarch to have exerted himſelf to prevent ſuch a conqueſt; but as his predominant paſſion was the love of money, he could not bear the thoughts of embarking in ſuch an expenſive project, till it was too late. In 1491, the king of France annexed that duchy unalienably to his crown, by marrying the young ducheſs, though ſhe had been already contracted to the emperor Maximilian. By this piece of negligence, Henry ſuffered a great check on the power of the French monarchs to be removed; and ever ſince that time, England, even though united to Scotland, hath found it much harder to cope with France than before. After Bretagne was irreparably loſt, however, the Engliſh monarch, urged by the clamours of his people, invaded France in 1492. He gave out that he had nothing leſs in view than an entire conqueſt of the country: nevertheleſs, on the third of November the ſame year, he made peace with Charles, on condition of his paying him 745,000 crowns, at that time, and a yearly penſion of 25,000 crowns ever after.

68
His expedition into Italy, and ſurpriſing ſucceſs.

The king of France agreed to theſe terms the more readily, that he was impatient to undertake an expedition into Italy, in order to conquer the kingdom of Naples, to which he claimed a right. Moſt of his counſellors were againſt the expedition; but the king was inflexible, even though Ferdinand king of Naples offered to do homage for his kingdom, and pay him a tribute of 50,000 crowns a-year. He appointed Peter duke of Bourbon regent, in his abſence, after which he ſet out on his expedition with very few troops and very little money. By the way he fell ill of the ſmall-pox, but in a ſhort time recovered, and entering Italy with only 6000 horſe and 12,000 foot, he was attended with the moſt ſurpriſing ſucceſs, traverſing the whole country in ſix weeks, and becoming maſter of the kingdom of Naples in leſs than a fortnight. Such extraordinary good fortune ſeemed miraculous, and he was reckoned an inſtrument raiſed up by God to deſtroy the execrable tyrants with which Italy was at that time infeſted. Had Charles made uſe of this prepoſſeſſion in his favour, and acted up to the character generally given him, he might have raiſed his name as high as any hero of antiquity. His behaviour, however, was of a very different nature. He amuſed himſelf with feaſts and ſhews: and leaving his power in the hands of favourites, they abandoned it to whoever would purchaſe titles, places, or authority, at the rates they impoſed; and the whole force he propoſed to leave in his new conquered dominions amounted to no more than 4000 men.

But while Charles was thus loſing his time, a league was concluded againſt him at Venice; into which entered the pope, the emperor Maximilian, the archduke Philip, Ludowic Sforza, and the Venetians. The confederates aſſembled an army of 40,000 men, commanded by Francis marquis of Mantua; and they waited for the king in the valley of Farnova, in the duchy of Parma, into which he deſcended with 9000 men. On the 6th of July 1495, he attacked the allies; and, notwithſtanding their great ſuperiority, defeated them, with the loſs of only 80 of his own men. Thus he got ſafe to France; but his Italian dominions were loſt almoſt as ſoon as he departed. Some ſchemes were propoſed for recovering theſe conqueſts; but they were never put in execution, and the king died of an apoplexy in 1498.

69 His death.

70 Expedition of Lewis XII. into Italy.

Lewis XII. duke of Orleans, ſucceeded to the throne of France; and on his acceſſion found the face of affairs in Italy very much changed to his advantage. The pope, Alexander VI. was very much in his intereſts, from the hopes of getting his ſon Ceſar Borgia provided for: he had conciliated the friendſhip of the Venetians by promiſing them a part of the Milaneſe; he concluded a truce with the archduke Philip; and renewed his alliances with the crowns of England, Scotland, and Denmark. He then entered Italy with an army of 20,000 men; and, being aſſiſted by the Venetians, quickly conquered one part of the duchy, while they conquered the other, the duke himſelf being obliged to fly with his family to Inſpruck. He then attacked Ferdinand of Spain with three armies at once, two to act by land, and one by ſea; but none of theſe performing any thing remarkable, he was obliged to evacuate the kingdom of Naples in 1504.

In 1506, the people of Genoa revolted; drove out the nobility; choſe eight tribunes; and declared Paul Nuova, a ſilk-dyer, their duke: after which they expelled the French governor, and reduced a great part of the Riviera. This occaſioned Lewis's return into Italy; where, in 1507, he obliged the Genoeſe to ſurrender at diſcretion; and, in 1508, entered into the league of Cambray, with the other princes who at that time wanted to reduce the overgrown power of the Venetians. Pope Julius II. who had been the firſt contriver of this league, very ſoon repented of it; and declared, that if the Venetians would reſtore the cities of Faenza and Rimini, which had been unjuſtly taken from him, he would be contented. This was refuſed; and in 1509, the forces of the republic received ſuch an entire defeat from Lewis, that they agreed to reſtore not only the two cities demanded by pope Julius, but whatever elſe the allies required.

The pope now, inſtead of executing his treaties with his allies, made war on the king of France without the leaſt provocation. Lewis called an aſſembly of his clergy; where it was determined, that in ſome caſes it was lawful to make war upon the pope; upon which the king declared war againſt him, and committed the care of his army to the Marſhal de Trivulce. He ſoon obliged the pope to retire into Ravenna; and in 1511, Gaſton de Foix, duke of Nemours, gained a great victory at Ravenna, but was himſelf killed in the engagement. After his death the army diſbanded for want of pay; and the French affairs in Italy, and every where elſe, fell into great confuſion. They recovered the duchy of Milan, and loſt it again in a few weeks. Henry VIII. of England invaded France, and took Terruenne and Tournay; and the Swiſs invaded Burgundy with an army of 25,000 men. In this deſperate ſituation of affairs the queen died, and Lewis put an end to the oppoſition of his moſt dangerous enemies by negociating marriages. To Ferdinand of Spain, he offered his ſecond daughter for either of his grandſons, Charles or Ferdinand; and to renounce, in favour of that marriage, his claims on Milan and Genoa. This propoſal was accepted; and Lewis himſelf married the princeſs Mary, ſiſter to Henry VIII. of England. This marriage he did not long ſurvive, but died on the 2d of January 1514; and was ſucceeded by Francis I. count of Angouleſme, and duke of Bretagne and Valois.

71 His marriage with the princeſs Mary of England, and death.

72 Francis I. invades Italy.

The new king was no ſooner ſeated on the throne, than he reſolved on an expedition into Italy. In this he was at firſt ſucceſsful, defeating the Swiſs at Marignano, and reducing the duchy of Milan. In 1518, the emperor Maximilian dying, Francis was very ambitious of being his ſucceſſor, and thereby reſtoring to France ſuch a ſplendid title, which had been ſo long loſt. But Maximilian, before his death, had exerted himſelf ſo much in favour of Charles V. of Spain, that Francis found it impoſſible to ſucceed; and from that time an irreconcileable hatred took place between the two monarchs. In 1521, this ill-will produced a war; which, however, might perhaps have been terminated if Francis could have been prevailed upon to reſtore the town of Fontarabia, which had been taken by his admiral Bonivet: but this being refuſed, hoſtilities were renewed with greater vigour than ever; nor were they concluded till France was brought to the very brink of deſtruction. The war was continued with various ſucceſs, till the year 1524; when Francis, having invaded Italy, and laid ſiege to Pavia, he was utterly defeated before that city, and taken priſoner on the 24th of February.

73 Defeated and taken priſoner.

This diſaſter threw the whole kingdom into the utmoſt confuſion. The Flemiſh troops made continual inroads; many thouſand boors aſſembled in Alſace, in order to make an invaſion from that quarter; Henry VIII. had aſſembled a great army, and threatened the kingdom on that ſide alſo; and a party was formed in the kingdom, in order to diſpoſſeſs the ducheſs of the regency, and confer it upon the duke de Vendoſme. This prince, however, who, after the conſtable, was the head of the Houſe of Bourbon, went on purpoſe to Lyons, where he aſſured the regent that he had no view but for her ſervice, and that of his country; upon which ſhe formed a council of the ableſt men of the kingdom, and of this ſhe made him preſident. The famous Andrew Doria ſailed with the French galleys to take on board the remains of the French troops under the duke of Alva, whom he landed ſafely in France. Thoſe who eſcaped out of the Milaneſe alſo made their way back again as well as they could. Henry VIII. under the influence of cardinal Wolſey, reſolved not to oppreſs the oppreſſed: he therefore aſſured the regent that ſhe had nothing to fear from him; and at the ſame time adviſed her not to conſent to any treaty by which France was to be diſmembered. To the emperor, however, he uſed another language. He told him, that the time was now come when this puiſſant monarchy lay at their mercy; and therefore, that ſo favourable an opportunity ſhould not be let ſlip: that, for his part, he ſhould be content with Normandy dy, Guienne, and Gaſcony, and hoped the empire would make no ſcruple of owning him king of France; adding, that he expected the emperor would make a right uſe of his victory, by entering Guienne in perſon, in which caſe he was ready to bear half the expences of the war. He foreſaw what fell out: the emperor was alarmed at theſe conditions, and did not care to have him for a neighbour; for which reaſon he agreed to a truce with the regent for ſix months. In Picardy the Flemings were repulſed; and the count de Guiſe, with the duke of Lorrain, had the good fortune, with a handful of troops, to defeat and cut to pieces the German peaſants.

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79 Henry's ſucceſs againſt the emperor.

80 He is killed at a tournament.

This year, an edict was made to reſtrain the extravagant remittances which the clergy had been in uſe of making to the court of Rome, and for correcting ſome other abuſes committed by the papal notaries. With this edict pope Julius III. was highly diſpleaſed; and the following year (1550), war was declared by the king of France againſt the pope and the emperor. The pretence was, that Henry protected Octavio Farneſe duke of Parma, whom the pope was deſirous of depriving of his dominions. In this war the king was threatened with the cenſures of the church, more eſpecially when it was known that he had entered into an alliance with the Turks, and a Turkiſh fleet entered the Mediterranean, where they threatened the Iſle of Gozo, and made deſcents upon Sicily, Henry, however, ſtrongly denied any ſuch connection, and inſiſted that the emperor had given them ſufficient provocation: but, be this as it will, the emperor ſoon found himſelf in ſuch danger from theſe new enemies, that he could not ſupport the pope as he intended, who on that account was obliged to ſue for peace. After this, the king continued the war againſt the emperor with ſucceſs; reducing the cities of Toul, Verdun, and Metz. He then entered the country of Alſace, and reduced all the fortreſſes between Hagenau and Wiſſenburg. He failed, however, in his attempt on Straſburgh; and was ſoon after obliged by the German princes and the Swiſs to deſiſt from further conqueſts on that ſide. This war continued with very little interruption, and as little ſucceſs on the part of the French, till the year 1557, when a peace was concluded; and ſoon after, the king was killed at a tournament by one count de Montgomery, who was reckoned one of the ſtrongeſt knights in France, and who had done all he could to avoid this encounter with the king.

81 Civil wars with the Proteſtants.

The reign of his ſucceſſor Francis II. was remarkable only for the perſecution of the Proteſtants; which became ſo grievous, that they were obliged to take up arms in their own defence. This occaſioned ſeveral civil wars, the firſt of which commenced in the reign of Charles IX. who ſucceeded to the throne in 1560. This firſt war continued till the year 1562, when a peace was concluded, by which the Proteſtants were to have a free pardon, and liberty of conſcience. In 1565, the war broke out anew, and was continued with very little interruption till 1569, when peace was again concluded upon very advantageous terms for the Proteſtants. After this, king Charles, who had now taken the government into his hands, careſſed the Proteſtants in an extraordinary manner. He invited to court the admiral Coligni, who was the head of the Proteſtant party; and cajoled him ſo, that he was lulled into a perfect ſecurity, notwithſtanding the many warnings given him by his friends, that the king's fair ſpeeches were by no means to be truſted: but he had ſoon reaſon to repent his confidence. On the 22d of Auguſt 1571, as he was walking from the court to his lodgings, he received a ſhot from a window; which carried away the ſecond finger of his right hand, and wounded him grievouſly in the left arm. This he himſelf

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In 1549, a peace being concluded with England, the king purchaſed Boulogne from the latter, for the ſum of 400,000 crowns; one half to be paid on the day of reſtitution, and the other a few months after. Scotland was included in the treaty, and the Engliſh reſtored ſome places they had taken there. This was the moſt advantageous peace that France had hitherto made with England; the vaſt arrears which were due to that crown being in effect remitted; and the penſion, which looked ſo like tribute, not being mentioned, was in fact extinguiſhed. The earl of Warwick himſelf, who had concluded the peace, was ſo ſenſible of the diſgrace ſuffered by his nation on this occaſion, that he pretended to be ſick, in order to avoid ſetting his hand to ſuch a ſcandalous bargain.

France.

This year, an edict was made to reſtrain the extravagant remittances which the clergy had been in uſe of making to the court of Rome, and for correcting ſome other abuſes committed by the papal notaries. With this edict pope Julius III. was highly diſpleaſed; and the following year (1550), war was declared by the king of France againſt the pope and the emperor. The pretence was, that Henry protected Octavio Farneſe duke of Parma, whom the pope was deſirous of depriving of his dominions. In this war the king was threatened with the cenſures of the church, more eſpecially when it was known that he had entered into an alliance with the Turks, and a Turkiſh fleet entered the Mediterranean, where they threatened the Iſle of Gozo, and made deſcents upon Sicily. Henry, however, ſtrongly denied any ſuch connection, and inſiſted that the emperor had given them ſufficient provocation: but, be this as it will, the emperor ſoon found himſelf in ſuch danger from theſe new enemies, that he could not ſupport the pope as he intended, who on that account was obliged to ſue for peace. After this, the king continued the war againſt the emperor with ſucceſs; reducing the cities of Toul, Verdun, and Metz. He then entered the country of Alſace, and reduced all the fortreſſes between Hagenau and Wiſſenburg. He failed, however, in his attempt on Straſburgh; and was ſoon after obliged by the German princes and the Swiſs to deſiſt from further conqueſts on that ſide. This war continued with very little interruption, and as little ſucceſs on the part of the French, till the year 1557, when a peace was concluded; and ſoon after, the king was killed at a tournament by one count de Montgomery, who was reckoned one of the ſtrongeſt knights in France, and who had done all he could to avoid this encounter with the king.

79 Henry's ſucceſs againſt the emperor.

80 He is killed at a tournament.

81 Civil wars with the Proteſtants.

The reign of his ſucceſſor Francis II. was remarkable only for the perſecution of the Proteſtants; which became ſo grievous, that they were obliged to take up arms in their own defence. This occaſioned ſeveral civil wars, the firſt of which commenced in the reign of Charles IX. who ſucceeded to the throne in 1560. This firſt war continued till the year 1562, when a peace was concluded, by which the Proteſtants were to have a free pardon, and liberty of conſcience. In 1565, the war broke out anew, and was continued with very little interruption till 1569, when peace was again concluded upon very advantageous terms for the Proteſtants. After this, king Charles, who had now taken the government into his hands, careſſed the Proteſtants in an extraordinary manner. He invited to court the admiral Coligni, who was the head of the Proteſtant party; and cajoled him ſo, that he was lulled into a perfect ſecurity, notwithſtanding the many warnings given him by his friends, that the king's fair ſpeeches were by no means to be truſted: but he had ſoon reaſon to repent his confidence. On the 22d of Auguſt 1571, as he was walking from the court to his lodgings, he received a ſhot from a window; which carried away the ſecond finger of his right hand, and wounded him grievouſly in the left arm. This he himſelf aſcribed to the malice of the duke of Guiſe, the head of the Catholic party. After dinner, however, the king went to pay him a viſit, and amongſt others made him this compliment, "You have received the wound, but it is I who ſuffer;" deſiring at the ſame time, that he would order his friends to quarter about his houſe, and promiſing to hinder the Catholics from entering that quarter after it was dark. This ſatisfied the admiral of the king's ſincerity; and hindered him from complying with the deſires of his friends, who would have carried him away, and who were ſtrong enough to have forced a paſſage out of Paris if they had attempted it.

82
Dreadful maſſacre of the Proteſtants.

In the evening, the queen-mother, Katherine de Medicis, held a cabinet-council to fix the execution of the maſſacre of the Proteſtants, which had been long meditated. The perſons of which this council was compoſed, were, Henry duke of Anjou, the king's brother; Gonzagua duke of Nevers; Henry of Angouleſme, grand prior of France, and baſtard brother of the king; the marſhal de Tavannes; and Albert de Gondi, count de Rhetz. The direction of the whole was given to the duke of Guiſe, to whom the adminiſtration had been entirely confided during the former reign. The guards were appointed to be in arms, and the city-officers were to diſpoſe the militia to execute the king's orders, of which the ſignal was the ringing of a bell near the Louvre. Some ſay, that when the hour approached, which was that of midnight, the king grew indetermined: that he expreſſed his horror at ſhedding ſo much blood, eſpecially conſidering that the people whom he was going to deſtroy were his ſubjects, who had come to the capital at his command, and in confidence of his word; and particularly the admiral, whom he had detained ſo lately by his careſſes. The queen-mother, however, reproached him with his cowardice, and repreſented to him the great danger he was in from the Proteſtants; which at laſt induced him to conſent. According to others, however, the king himſelf urged on the maſſacre; and when it was propoſed to him to take off only a few of the heads, he cried out, "If any are to die, let there not be one left to reproach me with breach of faith."

As ſoon as the ſignal was given, a body of Swiſs troops, of the Catholic religion, headed by the duke of Guiſe, the chevalier d'Angouleſme, accompanied by many perſons of quality, attacked the admiral's houſe. Having forced open the doors, the foremoſt of the aſſaſſins ruſhed into his apartment; and one of them aſked if he was Coligni? To this he anſwered that he was; adding, "Young man, reſpect theſe grey hairs:" to which the aſſaſſin replied by running him through the body with his ſword. The duke of Guiſe and the chevalier, growing impatient below ſtairs, cried out to know if the buſineſs was done; and being told that it was, commanded that the body ſhould be thrown out at the window. As ſoon as it fell on the ground, the chevalier, or (as ſome ſay) the duke of Guiſe, wiping the blood off the face kicked it with his foot. The body was then abandoned to the fury of the populace; who, after a ſeries of indignities, dragged it to the common gallows, to which they chained it by the feet, the head being cut off and carried to the queen-mother; who, it is ſaid, cauſed it to be embalmed and ſent to Rome. The king himſelf went to ſee the body hang upon the gibbet; where, a fire being kindled under it, part was burnt, and the reſt ſcorched. In the Louvre the gentlemen belonging to the king of Navarre and the prince of Conde were murdered under the king's eye. Two of them wounded, and purſued by the aſſaſſins, fled into the bed-chamber of the queen of Navarre, and jumped upon her bed, beſeeching her to ſave their lives; and as ſhe went to aſk this favour of the queen-mother, two more, under the like circumſtances, ruſhed into the room, and threw themſelves at her feet. The queen-mother came to the window to enjoy theſe dreadful ſcenes; and the king, ſeeing the Proteſtants who lodged on the other ſide of the river, flying for their lives, called for his long gun, and fired upon them. In the ſpace of three or four days, many thouſands were deſtroyed in the city of Paris, by the moſt cruel deaths which malice itſelf could invent. Peter Ramus, profeſſor of philoſophy and mathematics, after being robbed of all he had, his belly being firſt ripped open, was thrown out of a window. This ſo much affected Denis Lambin the king's profeſſor, that, though a zealous Catholic, he died of terror. The firſt two days, the king denied it was done by his orders, and threw the whole blame on the houſe of Guiſe: but, on the 28th of Auguſt, he went to the parliament, avowed it, was complimented upon it, and directed a proceſs againſt the admiral, by which he was ſtigmatized as a traitor. Two innocent gentlemen ſuffered as his accomplices in a pretended plot againſt the life of the king, in order to ſet the crown on the head of the prince of Conde. They were executed by torch-light; and the king and the queen-mother (with the king of Navarre and the prince of Conde by force), were ſpectators of this horrid fact; and they alſo aſſiſted at the jubilee to thank God for the execution of ſuch an infamous deſign.

This maſſacre was not confined to the city of Paris alone. On the eve of St Bartholomew, orders had been ſent to the governors of provinces to fall upon the Proteſtants themſelves, and to let looſe the people upon them: and though an edict was publiſhed before the end of the week, aſſuring them of the king's protection, and that he by no means deſigned to exterminate them becauſe of their religion, yet private orders were ſent, of a nature directly contrary; in conſequence of which, the maſſacre, or (as, in alluſion to the Sicilian veſpers *, it was now ſtyled) the *Matins of Paris*, were repeated in Meaux, Orleans, Troyes, Angers, Tholouſe, Rouen, and Lyons; ſo that in the ſpace of two months 30,000 Proteſtants were butchered. The next year Rochelle, the only ſtrong fortreſs which the Proteſtants held in France, was beſieged, but was not taken without the loſs of 24,000 of the Catholics who beſieged it. After this a pacification enſued on terms favourable to the Proteſtants, but to which they never truſted.

83
Death of Charles IX.

This year the duke of Anjou was elected king of Poland, and ſoon after ſet out to take poſſeſſion of his new kingdom. The king accompanied him to the frontiers of the kingdom; but during the journey was ſeized with a ſlow fever, which from the beginning had a very dangerous appearance. He lingered for ſome time under the moſt terrible agonies both of body and mind; and at laſt died on the 30th of May 1572, ha-

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* See *Sicily*.

ving lived 24 years, and reigned 13. It is ſaid, that after the deadful maſſacre abovementioned, this prince had a fierceneſs in his looks and a colour in his cheeks which he never had before. He ſlept little, and never ſound. He waked frequently in agonies, and had ſoft muſic to compoſe him again to reſt.

84
Henry III.

During the firſt years of the reign of Henry III. who ſucceeded his brother Charles, the war with the Proteſtants was carried on with indifferent ſucceſs on the part of the Catholics. In 1575, a peace was concluded, called by way of eminence the *Edict of Pacification*. It conſiſted of no fewer than 63 articles; the ſubſtance of which was, that liberty of conſcience, and the public exerciſe of religion, were granted to the reformed, without any other reſtriction than that they ſhould not preach within two leagues of Paris or any other part where the court was: Party-chambers were erected in every parliament, to conſiſt of equal numbers of Catholics and Proteſtants, before whom all judgments were to be tried: The judgments againſt the admiral, and, in general, all who had fallen in the war or been executed, were reverſed; and eight cautionary towns were given to the Proteſtants.

85
Catholic league formed.

This edict gave occaſion to the Guiſes to form an aſſociation in defence, as was pretended, of the Catholic religion, afterwards known by the name of the *Catholic League*. In this league, though the king was mentioned with reſpect, he could not help ſeeing that it ſtruck at the very root of his authority: for, as the Proteſtants had already their chiefs, ſo the Catholics were, for the future, to depend entirely upon the chief of the league; and were, by the very words of it, to execute whatever he commanded, for the good of the cauſe, againſt any, without exception of perſons. The king, to avoid the bad effects of this, by the advice of his council declared himſelf head of the league; and of conſequence recommenced the war againſt the Proteſtants, which was not extinguiſhed as long as he lived.

86
Duke of Guiſe murdered, and likewiſe the king.

The faction of the duke of Guiſe, in the mean time, took a reſolution of ſupporting Charles cardinal of Bourbon, a weak old man, as preſumptive heir of the crown. In 1584, they entered into a league with Spain, and took up arms againſt the king: and tho' peace was concluded the ſame year, yet, in 1587, they again proceeded to ſuch extremities, that the king was forced to fly from Paris. Another reconciliation was ſoon after effected, but it is generally believed that the king from this time reſolved on the deſtruction of Guiſe. Accordingly, finding that this nobleman ſtill behaved towards him with his uſual inſolence, the king cauſed him to be ſtabbed, as he was coming into his preſence, by his guards, on the 23d of December 1587. The king himſelf did not long ſurvive him; being ſtabbed by one James Clement, a Jacobine monk, on the 1ſt of Auguſt 1588. His wound at firſt was not thought mortal: but his frequent ſwooning quickly diſcovered his danger; and he died next morning, in the 39th year of his age, and 16th of his reign.

87
Henry IV.

Before the king's death, he nominated Henry Bourbon king of Navarre for his ſucceſſor on the throne of France; but as he was a Proteſtant, or at leaſt one who greatly favoured their cauſe, he was at firſt owned by very few except thoſe of the Proteſtant party. He met with the moſt violent oppoſition from the members of the Catholic league; and was often reduced to ſuch ſtraits, that he went to people's houſes under colour of viſits, when in reality he had not a dinner in his own. By his activity and perſeverance, however, he was at laſt acknowledged throughout the whole kingdom, to which his abjuration of the Proteſtant religion contributed not a little. As the king of Spain had laid claim to the crown of France, Henry no ſooner found himſelf in a fair way of being firmly ſeated on the throne, than he formally declared war againſt that kingdom; in which he at laſt proved ſucceſsful, and in 1597 entered upon the quiet poſſeſſion of his kingdom.

88
Edict of Nantes.

The king's firſt care was to put an end to the religious diſputes which had ſo long diſtracted the kingdom. For this purpoſe, he granted the famous edict, dated at Nantes, April 13th 1598. It reeſtabliſhed, in a moſt ſolid and effectual manner, all the favours that had ever been granted to the reformed by other princes; adding ſome which had not been thought of before, particularly the allowing them a free admiſſion to all employments of truſt, profit, and honour; the eſtabliſhing chambers in which the members of the two religions were equal; and the permitting their children to be educated without conſtraint in any of the univerſities. Soon after, he concluded peace with Spain upon very advantageous terms. This gave him an opportunity of reſtoring order and juſtice throughout his dominions; of repairing all the ravages occaſioned by the civil war; and aboliſhing all thoſe innovations which had been made, either to the prejudice of the prerogatives of the crown, or the welfare of the people.

89
The king propoſes to new-model the European powers.

His ſchemes of reformation, indeed, he intended to have carried beyond the boundaries of France. If we may believe the duke of Sully, he had in view no leſs a deſign than the new-modelling of all Europe. He imagined that the European powers might be formed into a kind of Chriſtian republic, by rendering them as nearly as poſſible of equal ſtrength; and that this republic might be maintained in perpetual peace, by bringing all their differences to be decided before a ſenate of wiſe, diſintereſted, and able judges: and then, he thought, it would be no difficult matter to overturn the Ottoman empire. The number of theſe powers was to be 15, viz. the Papacy; the empire of Germany; France, Spain; Hungary; Great Britain; Bohemia; Lombardy; Poland; Sweden; Denmark; the Republic of Venice; the States-General; the Swiſs Cantons; and the Italian commonwealth, which was to comprehend the States of Florence, Genoa, Lucca, Modena, Parma, Mantua, and Monaco. In order to render the States equal, the empire was to be given to the duke of Bavaria; the kingdom of Naples to the pope; that of Sicily to the Venetians; Milan to the duke of Savoy, who, by this acquiſition, was to become king of Lombardy; the Auſtrian Low Countries were to be added to the Dutch republic; Franche Compte, Alſace, and the country of Trent, were to be given to the Swiſs. With a view, it is now thought, of executing this grand project, but under pretence of reducing the exorbitant power of the Houſe of Auſtria, Henry made immenſe preparations both by ſea and land; but if he really had ſuch a deſign, he was prevented by death from attempting to execute it. He was ſtabbed in his coach by one Ravilliac, on the 12th of May 1608.

90 He is murdered.

On the death of Henry IV. the queen-mother aſſumed the regency. Ravilliac was executed, after ſuffering horrid tortures. It is ſaid that he made a confeſſion, which was ſo written by the perſon who took it down, that not one word of it could ever be read, and thus his inſtigators and accomplices could never be diſcovered. The regency, during the minority of Lewis XIII. was only remarkable for cabals and intrigues of the courtiers. In 1617, the king aſſumed the government himſelf, baniſhed the queen-mother to Blois, and cauſed her favourite marſhal d'Ancre to be killed. In 1620, a new war broke out between the Catholics and Proteſtants, which was carried on with the greateſt fury on both ſides; and we may judge of the ſpirit which actuated both parties, by what happened at Negrepliſſe a town in Quercy. This place was beſieged by the king's troops, and it was reſolved to make an example of the inhabitants. The latter, however, abſolutely refuſed to ſurrender upon any terms. They defended themſelves, therefore, moſt deſperately; and the city being at laſt taken by ſtorm, they were all maſſacred, without reſpect of rank, ſex, or age, except ten men. When theſe were brought into the king's preſence, he told them they did not deſerve mercy: they anſwered, that they would not receive it; that the only favour they aſked, was to be hanged on trees in their own gardens; which was granted, and the place reduced to aſhes. Both parties ſoon became weary of ſuch a deſtructive war; and a peace was concluded in 1621, by which the edict of Nantes was confirmed. This treaty, however, was of no long duration. A new war broke out which laſted till the year 1628, when the edict of Nantes was again confirmed, only the Proteſtants were deprived of all their cautionary towns, and conſequently of the power of defending themſelves in time to come. The next year, the king was attacked with a ſlow fever which nothing could allay, an extreme depreſſion of ſpirits, and a ſurpriſing ſwelling in his ſtomach and belly. The year after, however, he recovered, to the great diſappointment of his mother, who had been in hopes of regaining her power. She was arreſted; but found means to eſcape into Flanders, where ſhe remained during the reſt of this reign. The king died in 1643, having carried on a long war with Spain with indifferent ſucceſs.

91 Lewis XIII.

92 Lewis XIV.

Lewis XIV. ſurnamed *Le Grand*, ſucceeded to the throne when he was only five years of age. During his minority, the cardinal Mazarine, to whom the adminiſtration was wholly intruſted, procured a revocation of the edict of Nantes, and rendered the government abſolute. This monarch brought the glory of France to the higheſt pitch, for which he was indebted to the famous generals who commanded his armies, the viſcount Turrenne, the prince of Conde, &c.; an account of whoſe exploits is given under the articles **Spain**, **Germany**, **Italy**, **United**-*Provinces*, &c. At laſt the immeaſurable ambition of Lewis occaſioned a general confederacy of the ſtates of Europe againſt him. At the head of this confederacy was William III. king of England; but as long as he had the command of the allied army, the arms of Lewis proved ſucceſsful. On his death, the war was renewed; and the allies, under the command of the duke of Marlborough and prince Eugene, reduced France to the loweſt ebb*. When the Britiſh forces were withdrawn, it became neceſſary for the other contending powers to conclude a peace; which was done at Utrecht, in 1713.

93 Lewis XV and XVI.

Lewis XIV. died on the 1ſt of September 1715; and was ſucceeded by his ſon Lewis XV. at that time only ſix years of age. He maintained two bloody wars with Great Britain, an account of which is given under the article **Britain**. After a reign of 59 years, he died in 1774; and was ſucceeded by his ſon Lewis XVI. the preſent king of France.

94 Diviſion of the kingdom.

The kingdom of France, according to Mr Templman, is divided into the following provinces.

Countries Names.	Square miles.	Length.	Breadth.	Chief Cities.
Orleannois	22,050	230	180	Orleans
Guienne	12,800	216	120	Bourdeaux
Gaſcoigne	8,800	125	90	Aux or Augh
Languedoc	13,175	200	115	Thoulouſe
Lyonnois	12,500	175	130	Lyons
Champagne	10,000	140	110	Rheims
Bretagne	9,100	170	105	Rennes
Normandy	8,200	155	85	Rouen
Provence	6,800	95	92	Aix
Burgundy	6,700	150	86	Dijon
Dauphinè	5,820	107	90	Grenoble
Iſle of France	5,200	100	85	**Paris** { N. Lat. 48. 50. E. Lon. 2-25.
French Compte	4,000	100	60	Beſançon
Picardy	3,650	120	87	Amiens
Rouſillon	1,400	50	44	Perpignan
Total—	131,095			

To theſe may be added ſeveral fine provinces, which, ſince the Reformation, have been annexed to this overgrown kingdom by marriage, purchaſe, or conqueſt, viz. part of the Netherlands, which will be found under the article **Netherlands**; the duchy of Lorrain; the countries of Alſace, Lower Navarre, and the iſland of Corſica: but the city of Avignon, with the Venaiſſin, was, in 1774, ceded to the pope.

95 Climate, ſoil, inhabitants, &c.

The air is pure, healthy, and temperate. The kingdom is ſo happily ſeated in the middle of the temperate zone, that ſome make it equal to Italy, with regard to the delightfulneſs of the landſkips, and the fertility of the ſoil: however, it is certainly much more healthful. The ſoil produces corn, wine, oil, and flax, in great abundance; and they have very large manufactures of linen, woollen, ſilk, and lace. They have a foreign trade to Spain, Italy, Turkey, and to the Eaſt and Weſt Indies. They themſelves reckon that the number of the inhabitants is 20,000,000. This kingdom contains 21 univerſities; 18 archbiſhopricks; 12 parliaments; 12 boards of accounts; 12 courts of aids; 2 courts, and 30 mints, for coining money; 2 ſupreme councils, beſides the grand council; and 31 governors. The king has the title of *Moſt Chriſtian;* and is an abſolute prince, to whom his ſubjects are extremely devoted, though he rule them ever ſo ſeverely. The politeneſs of the inhabitants is well known; but moſt people think them too ceremonious. In general, they are men of bright parts; and have ſo high an opinion of themſelves, that they look upon other nations with contempt: however, they are of a very reſtleſs diſpoſition, and engaged in war more than any other country in Europe; for which reaſon they are generally poor, though they might certainly be very rich, if they could let their neighbours live in quiet, without attempting continually to enlarge their dominions. They are ſuch ill obſervers of treaties, that *French faith* is now become a proverb; for they are bound by no ties, and never fail beginning a war when they think it is for their advantage. The king's revenue is large, his army very numerous, and he has 10,000 men always about his perſon. The kingdom is watered by a great number of rivers; of which the four principal are, the Loire, the Seine, the Rhone, and the Garonne, or Gironde. The parliaments have little or no ſhare in the government; and their buſineſs now is, to paſs the arrets or laws which the king is pleaſed to ſend them: however, they do not always pay a blind obedience to the king, for we have recent inſtances of their making a noble ſtand. In civil cauſes theſe parliaments are ſtill the laſt reſort, provided the court does not interpoſe. That of Paris is the moſt conſiderable, where the king often comes in perſon to ſee his royal acts recorded. It conſiſts of the dukes and peers of France, beſides the ordinary members, who purchaſe their places; and they only take cognizance of cauſes belonging to the crown. The revenues of the crown ariſe from the taille or land-tax, and the aids which proceed from the cuſtoms and duties on all merchandize except ſalt, for the tax upon that commodity is called the *gabelles*: beſides theſe, there are other taxes; as, the capitation or poll-tax; the tenths of all eſtates, offices, and employments; beſides the 15th penny, from which neither the nobility nor clergy are exempted. Add to theſe, the tenths and free-gifts of the clergy, who are allowed to tax themſelves; and laſtly, crown-rents, fines, and forfeitures, which bring in a conſiderable ſum. All theſe are ſaid to amount to 15,000,000 Sterling a-year. But the king has other reſources and ways of raiſing money, whenever neceſſity obliges him. The army, in time of peace, is ſaid to conſiſt of 200,000 men, and in time of war of 400,000; among which are many Swiſs, Germans, Scots, Iriſh, Swedes, and Danes. There is no religion allowed in France but the Roman Catholic, ever ſince the revocation of the edict of Nantz, in 1685; though they are not ſo devoted to the Pope as other nations of that communion, nor have they any inquiſition among them.

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* See *Britain*.

FRANCE, *the Iſle of*, a province of France, ſo called, becauſe it was formerly bounded by the river Seine, Marne, Oiſe, Aiſne, and Ourque. It comprehends, beſides Paris, the Beauvoſis, the Valois, the county of Senlis, the Vexin, the Hurepois, the Gatinois, the Multien, the Goele, and the Mantois. Paris is the capital.

FRANCESCA (Peter), an eminent Florentine painter of night-pieces and battles, was employed to paint the Vatican. He drew ſeveral portraits, and wrote on arithmetic and geometry: he died in 1458.

FRANCFORT *on the* MAIN, an Imperial and Hanſeatic town of Franconia in Germany. It is a handſome, ſtrong, and rich place, and has a great deal of commerce, but is built after the ancient taſte. Here the golden bull is preſerved, which is the original of the fundamental laws of the empire. The emperor is generally elected here, unleſs the plague or war will not admit of the ſolemnities proper to the occaſion. It is ſeated in a fine fertile plain, in E. Long. 8. 40. N. Lat. 49. 55.

FRANCFORT, *on the* ODER, a rich and handſome town of Germany, in the middle Marche of Brandenburg, formerly imperial, but now ſubject to the king of Pruſſia. E. Long. 15. 0. N. Lat. 52. 20.

FRANCHE-COMPTE, a province of France, bounded on the ſouth and weſt by Champagne and Burgundy; on the north by Lorrain; and to the eaſt by the earldom of Mumplegard, and Switzerland. It is in length from north to ſouth about 30 leagues, in breadth about 20. It is partly flat and partly hilly. The flat country is fruitful in grain, wine, hemp, and paſture; and the hilly country abounds in cattle, producing alſo ſome wine and corn, copper, lead, iron, and ſilver ores, mineral waters, and quarries of ſtone, marble, and alabaſter.

FRANCHISE, in law. *Franchiſe* and *liberty* are uſed as ſynonymous terms; and their definition is, "a royal privilege, or branch of the king's prerogative, ſubſiſting in the hands of a ſubject." Being therefore derived from the crown, they muſt ariſe from the king's grant; or, in ſome caſes, may be held by preſcription, which, as has been frequently ſaid, preſuppoſes a grant. The kinds of them are various, and almoſt infinite. We ſhall here briefly touch upon ſome of the principal; premiſing only, that they may be veſted in either natural perſons or bodies-politic; in one man, or in many: but the ſame identical franchiſe, that has before been granted to one, cannot be beſtowed on another, for that would prejudice the former grant.

Blackſt. Comment.

To be a county-palatine, is a franchiſe veſted in a number of perſons. It is likewiſe a franchiſe for a number of perſons to be incorporated and ſubſiſt as a body politic; with a power to maintain perpetual ſucceſſion, and do other corporate acts: and each individual member of ſuch corporation is alſo ſaid to have a franchiſe or freedom. Other franchiſes are, to hold a court-leet: to have a manor or lordſhip; or, at leaſt, to have a lordſhip paramount: to have waifs, wrecks, eſtrays, treaſure-trove, royal fiſh, forfeitures, and deodands: to have a court of one's own, or liberty of holding pleas and trying cauſes: to have the cognizance of pleas; which is a ſtill greater liberty, being an excluſive right, ſo that no other court ſhall try cauſes ariſing within that juriſdiction: to have a bailiwick, or liberty exempt from the ſheriff of the county; wherein the grantee only, and his officers, are to execute all proceſs: to have a fair or market; with the right of taking toll, either there or at any other public places, as at bridges, wharfs, or the like; which tolls muſt have a reaſonable cauſe of commencement, (as in conſideration of repairs, or the like), elſe the franchiſe is illegal and void: or laſtly, to have a foreſt, chaſe, park, warren, or fiſhery, endowed with privileges of royalty. See CHASE, FOREST, &c.

FRANCIA (Franceſia), a celebrated Bologneſe painter, born in 1450. He was firſt a goldſmith or jeweller, afterwards a graver of coins and medals; but applying at laſt to painting, obtained great reputation by his works, particularly by a piece of St Sebaſtian, whom he had drawn bound to a tree with his hands tied over his head. He pined himſelf into a conſumption, by deſpairing to equal Raphael; and died in 1518.

FRANCIS I. king of France, the rival of the emperor Charles V. and the reſtorer of learning and politeneſs in France. See (*Hiſtory* of) FRANCE.

FRANCIS *of Aſſiſi* (St), founder of the Franciſcan friars, was born at Aſſiſi in Italy in 1181. One of the moſt extraordinary things told of St Francis of Aſſiſi is, that Jeſus Chriſt imprinted on him the marks of his five wounds; and there is a feſtival in memory of thoſe holy prints, and an office for it. His preaching to the fiſhes to make them Chriſtians, and his converſion of millions of them, is famous; as is his mercy to worms and lice. The order he founded, and which bears his name, was approved by Innocent III. in 1215, and confirmed by Honorius III. in 1223. It has ſince branched into ſeveral others, as Minims, Ricolets, Capuchins, &c. called in Roman-Catholic countries, *Fratres Minores*.

FRANCISCAN MONKS, FRIARS *Minor*, or *Grey-Friars*; religious of the order of St Francis, founded by him in the year 1209. See FRANCIS *of Aſſiſi*.

The rule of the Franciſcans, as eſtabliſhed by St Francis himſelf, is briefly this: they are to live in common, to obſerve chaſtity, and to pay obedience to the pope and their ſuperiors.

Before they can be admitted into the order, they are obliged to ſell all they have, and give it to the poor: they are to perform a year's noviciate; and, when admitted, never to quit the order upon any account. They are to faſt from the feaſt of All-ſaints, to the Nativity. This order has produced four popes, 42 cardinals, and an infinite number of patriarchs.

FRANCONIA, a circle of the German empire, lying between Bohemia on the eaſt, and the electorate of Mentz on the weſt. Its capital is Nuremburg; and from this country the Franks, who conquered and gave name to the kingdom of France, are ſaid to have come.

FRANGULA, in botany. See RHAMNUS.

FRANK LANGUAGE, *Lingua Franca*, a kind of jargon ſpoken on the Mediterranean, and particularly throughout the coaſts and parts of the Levant, compoſed of Italian, Spaniſh, French, vulgar Greek, and other languages.

FRANK, or *Franc*, an ancient coin, either of gold or ſilver, ſtruck and current in France. The value of the gold franc was ſomething more than that of the gold crown; the ſilver franc was a third of the gold one: this coin is long out of uſe, tho' the term is ſtill retained as the name of a money of account; in which ſenſe it is equivalent to the livre, or 20 ſols.

FRANK, or *Franc*, meaning literally *free* from charges and impoſitions, or exempt from public taxes, has various ſignifications in the ancient Engliſh cuſtoms.

FRANK *Almoigne*, (*libera eleemoſyna*), or "free alms;" a tenure of a ſpiritual nature, whereby a religious corporation, aggregate or ſole, holdeth lands of the donor to them and their ſucceſſors for ever. The ſervice which they were bound to render for theſe lands was not certainly defined: but only in general to pray for the ſouls of the donor and his heirs, dead or alive; and therefore they did no fealty, (which is incident to all other ſervices but this), becauſe this divine ſervice was of a higher and more exalted nature. This is the tenure by which almoſt all the ancient monaſteries and religious houſes held their lands; and by which the parochial clergy, and very many eccleſiaſtical and eleemoſynary foundations hold them at this day; the nature of the ſervice being upon the reformation altered, and made conformable to the purer doctrines of the church of England. It was an old Saxon tenure; and continued under the Norman revolution, through the great reſpect that was ſhewn to religion and religious men in ancient times. This is alſo the reaſon that tenants in frankalmoign were diſcharged of all other ſervices except the *trinoda neceſſitas*, of repairing the highways, building caſtles, and repelling invaſions; juſt as the druids, among the ancient Britons, had *omnium rerum immunitatem*. And even at preſent, this is a tenure of a very different nature from all others; being not in the leaſt feodal, but merely ſpiritual. For, if the ſervice be neglected, the law gives no remedy by diſtreſs, or otherwiſe, to the lord of whom the lands are holden; but merely a complaint to the ordinary or viſitor to correct it.

FRANK-*Chace* is defined to be a liberty of free chace, whereby perſons that have lands within the compaſs of the ſame, are prohibited to cut down any wood, &c. out of the view of the foreſter.

FRANK-*Fee*, ſignifies the ſame thing as holding lands and tenements in fee-ſimple; that is, to any perſon and his heirs, and not by ſuch ſervice as is required by ancient demeſne, but is pleaded at common law. See FEE.

FRANK-*Law*, a word applied to the free and common law of the land, or the benefit a perſon has by it.

He that for any offence loſeth this frank-law, incurs theſe inconveniencies, viz. He may not be permitted to ſerve on juries, nor uſed as an evidence to the truth; and if he has any thing to do in the king's court, he muſt not approach it in perſon, but appoint his attorney; his lands, goods, and chattels, ſhall be ſeized into the king's lands; and his lands be eſtreated, his trees rooted up, and his body committed to cuſtody.

FRANK-*Marriage*, in law, is where tenements are given by one man to another, together with a wife, who is the daughter or couſin to the donor, to hold in frank-marriage. By ſuch gift, though nothing but the word *frank-marriage* is expreſſed, the donees ſhall have the tenements to them, and the heirs of their two bodies begotten; that is, they are tenants in ſpecial tail. For this one word, *frankmarriage*, denotes, *ex vi termini*, not only an inheritance, like the word *frankalmoigne*, but likewiſe limits that inheritance; ſupplying, not only words of deſcent, but of procreation alſo. Such donees in frank-marriage are liable to no ſervice but fealty; for a rent reſerved therein is void until the fourth degree of conſanguinity be paſt between the iſſues of the donor and donee.

FRANK-*Pledge*, law, ſignifies a pledge or ſurety for the behaviour of freemen.

According to the ancient cuſtom of England, for the preſervation of the public peace, every free-born man, at the age of fourteen, except religious perſons, clerks, knights, and their eldeſt ſons, was obliged to give ſecurity for his truth and behaviour towards the king and his ſubjects, or elſe be impriſoned. Accordingly, a certain number of neighbours became interchangeably bound for each other, to ſee each perſon of their pledge forthcoming at all times, or to anſwer for the offence of any one gone away: ſo that whenever any perſon offended, it was preſently inquired in what pledge he was, and there the perſons bound either produced the offender in 31 days, or made ſatisfaction for his offence.

FRANK-*Tenement*. See TENURE.

FRANKED LETTERS. The privilege of letters coming free of poſtage, to and from members of parliament was claimed by the houſe of commons in 1660, when the firſt legal ſettlement of the preſent poſt-office was made; but afterwards dropped, upon a private aſſurance from the crown, that this privilege ſhould be allowed the members. And accordingly a warrant was conſtantly iſſued to the poſtmaſter-general, directing the allowance thereof to the extent of two ounces in weight: till at length it was expreſsly confirmed by 4 Geo. III. *c.* 24. which adds many new regulations, rendered neceſſary by the great abuſes crept into the practice of franking; whereby the annual amount of franked letters had increaſed from L. 23,600 in the year 1715, to L. 170,700 in the year 1763.

FRANKEN (Franciſcus), commonly called *Old Frank*, a famous Flemiſh painter, ſuppoſed to have been born about the year 1544: but tho' his works are well known, very few of the circumſtances of his life have been tranſmitted to poſterity. This maſter painted hiſtorical ſubjects from the Old and New Teſtaments; and was remarkable for introducing a great number of figures into his compoſitions, which he had the addreſs to groupe very diſtinctly. Vandyck often commended his works, and thought them worthy of a place in any collection.

FRANKEN (Franciſcus), diſtinguiſhed by the name of *Young Frank*, was the ſon of the former, born in the year 1580. He was inſtructed by his father; whoſe ſtyle he adopted ſo cloſely, that their works are frequently miſtaken. When he found himſelf ſufficiently ſkilled at home, he travelled into Italy for improvement in colouring; and, on his return, his works were much coveted. The moſt capital performance of this painter are, a ſcriptural performance in the church of Notre-dame at Antwerp; and an excellent picture, in a ſmall ſize, of Solomon's idolatry. Young Frank died in 1642.

FRANKENDAL, a ſtrong town of Germany, in the dominions of the Elector Palatine. It was taken by the Spaniards in 1623, by the Swedes in 1632, and burnt by the French in 1688. E. Long. 8. 29. N. Lat. 49. 28.

FRANKINCENSE. See INCENSE.

FRANKS, FRANKIS, or *Franquis*, an appellation given by the Turks, and other nations of Aſia, to all the people of the weſtern parts of Europe, to which they give the name of *Frankiſtan*.

Frank, or *Frenc*, primarily denotes a Frenchman; and, by extenſion, an European, becauſe, according to ſome, the French diſtinguiſhed themſelves above the other nations engaged in the holy war *. But Fa. Goar, in his notes on Codinus, *cap.* v. *n.* 43. furniſhes another origin of the appellation *Frank*, of greater antiquity than the former.—He obſerves, that the Greeks at firſt confined the name to the *Franci*, i. e. the German nations, who had ſettled themſelves in France or Gaul: but afterwards they gave the ſame name to the Apulians and Calabrians, after they had been conquered by the Normans; and at length the name was further extended to all the Latins. In this ſenſe, is the word uſed by divers Greek writers; as Comnenus, &c. who, to diſtinguiſh the French, call them the *weſtern Franks*.

* See *Croiſade*.

Du Cange adds, that about the time of Charlemagne, they diſtinguiſhed—eaſtern France; weſtern France; Latin, or Roman, France; and German France, which was the ancient France, afterwards called *Franconia*.

FRASCATI, a handſome town of Italy, ſeated near the ſame ſpot with the Tuſculum of Cicero. Here are a great number of magnificent palaces and delightful gardens. E. Long. 11. 43. N. Lat. 41. 48.

FRATERNITY, in the Roman Catholic countries, ſignifies a ſociety for the improvement of devotion.

Of theſe there are ſeveral ſorts; as, 1. The fraternity of the roſary, founded by St Dominic. It is divided into two branches, called the *common roſary*, and the *perpetual roſary*; the former of whom are obliged to confeſs and communicate every firſt Sunday in the month, and the latter to repeat the roſary continually. See ROSARY.

2. The fraternity of the ſcapulary, whom the bleſſed Virgin, according to the ſabbatin bull of pope John XXII. has promiſed to deliver out of hell the firſt Sunday after their death. See SCAPULARY.

3. The fraternity of St Francis's girdle, are cloathed with a ſack of a grey colour, which they tie with a cord; and, in proceſſions, walk bare-footed, carrying in their hands a wooden croſs.

4. That of St Auſtin's leathern girdle, comprehends a great many devotees.

Italy, Spain, and Portugal, are the countries where one ſees the greateſt number of theſe fraternities, ſome of which aſſume the name of *arch-fraternities*. Pope Clement VII. inſtituted the arch-fraternity of charity, which diſtributes bread every Sunday among the poor, and gives portions to 40 poor girls on the feaſt of St Jerom their patron. The fraternity of death, buries ſuch dead as are abandoned by their relations, and cauſes maſſes to be celebrated for them.

FRATRICELLI, LITTLE BROTHERS, in church-hiſtory, a ſect of heretics who appeared in Italy about the year 1298, and afterwards ſpread all over Europe. They wore the habit of the Franciſcan order, and pretended that eccleſiaſtics ought to have no poſſeſſions of their own.

FRATRIAGE, the partition among brothers or coheirs, coming to the ſame inheritance or ſucceſſion.

FRATRES ARVALES. See ARVALES.

FRATRICIDE, the crime of murdering one's brother. See PARRICIDE.

FRAUD, in law, ſignifies deceit in grants, or conveyances of lands, &c. or in bargains and ſales of goods, &c. to the damage of another perſon.

A fraudulent conveyance of lands or goods to deceive creditors, as to creditors is void in law. And a fraudulent conveyance in order to defraud purchaſers, is alſo to ſuch purchaſers void; and the perſons juſtifying or putting off ſuch grants as good, ſhall forfeit a year's value of the lands, and the full value of the goods and chattels, and likewiſe ſhall be impriſoned. See Cheating.

FRAUSTADT, a town of Sileſia, on the frontiers of Poland, remarkable for a battle gained by the Swedes over the Saxons in 1706. E. Long. 15. 50. N. Lat. 51. 45.

FRAXINUS, the Ash; a genus of the diœcia order, belonging to the polygamia claſs of plants. There are ſix ſpecies; of which the moſt uſeful is the common aſh, which is ſo well known, that it needs no deſcription. If a wood of theſe trees is rightly managed, it will turn greatly to the advantage of the owner; for, by the underwood, which will be fit to cut every eight or ten years, there will be a continual income, more than ſufficient to pay the rent of the ground and all other charges; and ſtill there will be a ſtock preſerved for timber, which in a few years will be worth 40s. or 50s. per tree. This tree flouriſhes beſt in groves, but grows very well in rich ſoil in open fields. It bears tranſplanting and lopping. In the north of Lancaſhire they lop the tops of theſe trees to feed the cattle in autumn when the graſs is on the decline; the cattle peeling off the bark as food. The wood hath the ſingular property of being nearly as good when young as when old. It is hard and tough, and is much uſed to make the tools employed in huſbandry. The aſhes of the wood afford very good potaſh. The bark is uſed in tanning calf-ſkin. A ſlight infuſion of it appears of a pale yellowiſh colour when viewed betwixt the eye and the light; but when looked down upon, or placed betwixt the eye and an opake object, appears blue. This blueneſs is deſtroyed by the addition of an acid, but recovered by alkalies. The ſeeds are acrid and bitter. In the church-yard of Lochaber in Scotland, Dr Walker meaſured the trunk of a dead aſh-tree, which at five feet from the ſurface of the ground was 58 feet in circumference.—Horſes, cows, ſheep, and goats eat it; but it ſpoils the milk of cows, ſo that it ſhould not be planted in dairy farms.

FRAY, among ſportſmen. A deer is ſaid to fray its head, when it rubs it againſt a tree, to cauſe the pills of the new horns to come off.

FREAM, a name given by farmers to ploughed lands worn out of heart, and laid fallow till it recover.

FRECKLES, lentigines, ſpots of a yellowiſh colour, of the bigneſs of a lentile-ſeed, ſcattered over the face, neck, and hands. Freckles are either natural, or proceeding accidentally from the jaundice, or the action of the ſun upon the part. Heat, or a ſudden change of the weather, will often cauſe the ſkin to appear of a darker colour than natural; and thereby produce what is called *tan*, *ſunburn*, and *morphew*, which ſeem to differ only in degree; and uſually diſappear in winter.

Perſons of a fine complexion, and ſuch whoſe hair is red, are the moſt ſubject to freckles, eſpecially in thoſe parts which they expoſe to the air.

To remove freckles, put juice of lemons in a glaſs-vial, and, mixing it with ſugar and borax finely powdered, let it digeſt eight days, and then uſe it. Homberg propoſes bullock's gall mixed with alum, and, after the alum has precipitated, expoſed three or four months to the ſun in a cloſe vial, as one of the beſt remedies known for the removing of freckles.

FREDBERG, a rich, ſtrong, and fine town of Germany, in Miſnia, remarkable for its mines, and for being the burying place of the princes of the houſe of Saxony. It is a delightful place, ſeated on the river Multa. E. Long. 13. 40. N. Lat. 51. 2.

FREDERICA, a town of North America, in Georgia, ſeated at the mouth of the river Alatamaha, lately built and fortified by general Oglethorpe. The iſland it ſtands upon is called *St Simon's*; and is about 13 miles in length, and 4 in breadth. W Long. 81. 35. N. Lat. 31. 0.

FREDERICKSBURG, a fort and colony of Brandenburg, on the gold-coaſt of Guinea, in Africa, near Cape Three-points, and about 75 miles from Cape Coaſt. It mounts 46 pieces of cannon on four batteries; and formerly belonged to the Pruſſians, but is now ſubject to Denmark. W. Lon. 1. 15. N. Lat. 4. 30.

FREDERICKSHALL, or Fredericktadt, a ſtrong town of Norway, in the prefecture of Agerhuys, where Charles XII. king of Sweden was killed by a muſket-ball in 1718, when he was beſieging this town. It is ſeated on the coaſt of the Catagate, in E. Long. 10 45. N. Lat. 59. 2.

FREDERICKSODE, a town of Denmark, in Jutland, taken by the Swedes in 1657, but now ſubject to Denmark. It is ſeated near the ſea, in E. Long. 10. 0. N. Lat. 55. 42.

FREDERICKSTADT, a town of Denmark, in South Jutland, built in 1621. It is ſeated on the river Eyder, in E. Long. 9. 23. N. Lat. 54. 32.

Frederickstadt, a town of Norway, in the province of Agerhuys, ſeated on a bay of the ſea, near the frontiers of Sweden, in E. Long. 11. 6. N. Lat. 59. 12.

FREE, in a general ſenſe, is uſed in oppoſition to whatever is conſtrained or neceſſitated. When applied to things endowed with underſtanding, it more peculiarly relates to the liberty of the will.

Free-*Bench*, ſignifies that eſtate in copy-hold which the wife, being eſpouſed a virgin, has after the deceaſe of her huſband for her dower, according to the cuſtom of the manor.

In regard to this free-bench, different manors have different cuſtoms: and in the manor of eaſt and weſt Enbourne in the county of Berks, and in other parts of England, there is a cuſtom, that when a copyhold tenant dies, the widow ſhall have her free-bench in all the deceaſed huſband's lands, *dum ſola & caſta fuerit*, "whilſt ſhe lives ſingle and chaſte;" but if ſhe is found to be guilty of incontinency, ſhe ſhall forfeit her eſtate. Nevertheleſs, upon her coming into the court of the manor riding backwards on a black ram, with his tail in her hand, rehearſing a certain form of words, the ſteward is bound by cuſtom to reſtore her to her free-bench. The words are,

> Here I am,
> Riding on a black Ram,
> Like a whore as I am;
> And for my crincum crancum
> Have loſt my bincum bancum,
> And for my tail's game
> Have done this worldly ſhame:
> Therefore, pray, Mr Steward, let me have my land again.

Free *Fiſhery*. See *Free*-Fishery.

Free *Warren*. See Warren.

Free-*Hold*, ſignifies lands or tenements which a perſon holds in fee-ſimple, fee-tail, or for term of life. See Fee and Tail.

Free-*Stone*, a whitiſh ſtone, dug up in many parts of Britain, that works like alabaſter, but is more hard and durable; being of excellent uſe in building, &c. It is a kind of the grit ſtone, but finer ſanded, and ſmoother; and is called *free*, from its being of ſuch a conſtitution as to cut freely in any direction.

The qualities of the ſeveral kinds of free-ſtones uſed in the different parts of Europe are very different. They all agree in this general property indeed, that they are ſofter while in the quarry, than when they have been ſome time expoſed to the air: but even this general property differs greatly in degree. They have a ſort of grey free-ſtone in uſe at Paris, (of which we do not yet ſeem to have met with any in this country,) which has the abovementioned quality in ſo great a degree, that the expence of working it is in a great meaſure ſaved.

This ſtone lies every-where on the ſouth-ſide of the river Seine, and is of a coarſe and large grit. It is ſo ſoft when newly taken out of the ſtrata, that they faſhion it very conveniently with a ſort of broad ax, and form as many ſtones for building in this manner in an hour, as an equal number of our people do in a day or two. Though this ſtone is as ſoft as dry clay when firſt taken up, it is found to harden ſo conſiderably in the air, that it becomes more than equal to our ordinary free-ſtone.

Our Portland ſtone of the fineſt kind, which is white, and of a cloſe grit, is very fit for hewing and carving; but it will neither reſiſt water nor fire, which is a very ſingular inſtance in ſo denſe a ſtone; while the free-ſtone of Kent, which is leſs beautiful to the eye, and is of a greyiſh colour, and conſiderably cloſe, though of a larger grain, reſiſts the air and water very well.

The free-ſtone of Derbyſhire, on the other hand, is ſo brittle as to be unfit for any fine working; and ſo coarſe and open in its texture, that it lets water thro': yet it bears the fire extremely well, and is fit for ovens, hearths, &c,

FREEBOOTER, or Flibuster, a name given to the pirates who ſcour the American ſeas, particularly ſuch as make war againſt the Spaniards. See Bucaneer.

The French call them *flibuſters*, deducing the word from the Engliſh *flibote*, or *flybote*; by reaſon the firſt adventurers of this kind were the people of St Domingo, who made their excurſions with flybotes, which they had taken from the Engliſh.

FREEDOM, in general, the ſtate or quality of being free. See Liberty.

Freedom *of a Corporation*, the right of enjoying all the privileges and immunities belonging to it. See Corporation.

The freedom of cities, and other corporations, is regularly obtained by ſerving an apprenticeſhip; but it is alſo purchaſed with money, and ſometimes conferred by way of compliment.

Freedom *of Conſcience*. See Toleration.

Freedom *of the Will*, that power or faculty of the mind, whereby it is capable of acting or not acting, choosing or rejecting whatever it judges proper †. Of this every man muſt be ſenſible, who finds in himſelf a power to begin or forbear, continue or end ſeveral actions, barely by a thought or preference of the mind.

† See *Metaphyſics*, n° 78 80.

FREEZE, or Frieze, *Frize*, in commerce, a coarſe kind of woollen ſtuff, or cloth, for winter wear; ſo called, as being freezed or naped on each ſide †.

† See *Frizing.*

FREEZING, in philoſophy, the ſame with congelation. See Congelation and Frost.

Freezing *Rain*, or *Raining Ice*, a very uncommon kind of ſhower, which fell in the weſt of England, in December 1672; whereof we have divers accounts in the Philoſophical Tranſactions.

This rain, as ſoon as it touched any thing above ground, as a bough or the like, immediately ſettled into ice; and by multiplying and enlarging the icicles, broke all down with its weight. The rain that fell on the ſnow, immediately froze into ice, without ſinking in the ſnow at all.

It made an incredible deſtruction of trees, beyond any thing in all hiſtory. "Had it concluded with ſome guſt of wind, (ſays a gentleman on the ſpot), it might have been of terrible conſequence.

"I weighed the ſprig of an aſh tree, of juſt three quarters of a pound; the ice on which weighed 16 pounds. Some were frighted with the noiſe in the air; till they diſcerned it was the clatter of icy boughs, daſhed againſt each other." Dr Beale obſerves, that there was no conſiderable froſt obſerved on the ground during the whole; whence he concludes, that a froſt may be very intenſe and dangerous on the tops of ſome hills, and plains; while in other places it keeps at two, three, or four foot diſtance above the ground, rivers, lakes, &c. and may wander about very furious in ſome places, and remiſs in others not far off. The froſt was followed by glowing heats, and a wonderful forwardneſs of flowers and fruits. See Frost.

FREIGHT, in navigation and commerce, the hire of a ſhip, or a part thereof, for the conveyance and carriage of goods from one port or place to another; or the ſum agreed on between the owner and the merchant, for the hire and uſe of a veſſel. See *Maritime* Laws.

FREIND (John), a moſt learned Engliſh phyſician and writer in the 18th century, was born at Croton, Northamptonſhire, in 1675. In 1696, he publiſhed, in in conjunction with Mr P. Foulkes, an edition of two Greek orations, one of Æſchines againſt Cteſiphon, and the other of Demoſthenes *de Coronâ*, with a new Latin verſion. In 1699, he wrote a letter to Dr Sloane concerning an *Hydrocephalus*, publiſhed in the Philoſophical Tranſactions; and another letter in Latin to the ſame gentleman, *De ſpaſmis rarior. hiſtoria*, printed in the ſame Tranſactions. In 1703, his *Emmenalogia* appeared; which gained him great reputation. In 1704, he was choſen profeſſor of chemiſtry in the univerſity of Oxford. In 1705, he attended the earl of Peterborough to Spain, as phyſician to the army there; and upon his return in 1707, publiſhed an account of the earl's expedition and conduct. In 1709, he publiſhed his Chemical Lectures. In 1712, he attended the duke of Ormond in Flanders, as his phyſician. In 1716, he was admitted a fellow of the college of phyſicians in London. This year he publiſhed the firſt and third books of Hippocrates *De morbis popularibus*, with a Commentary on Fevers, written by himſelf. He ſat a member for the borough of

Launceſton in Cornwall, in 1722, where he diſtinguiſhed himſelf by his oppoſition to the adminiſtration. March 1722, he was committed to the tower on a charge of high-treaſon: and while he was under confinement, he wrote a Latin epiſtle to Dr Mead, *De quibuſdam variolarum generibus;* and began his Hiſtory of Phyſic, the firſt part of which was publiſhed in 1725, and the ſecond in 1726. Upon the acceſſion of George II. to the throne, he was appointed phyſician in ordinary to the queen, who ſhewed the utmoſt regard and eſteem for him. He died at London in 1728. His works were publiſhed together in Latin at London, 1733, in folio, and dedicated to the queen.

FREINSHEMIUS, a learned and elegant author, born at Ulm in 1608. He made ſupplements to Livy, Tacitus, and Q. Curtius, in 60 books, printed at Straſburg in 1654. He wrote likewiſe Notes upon Q. Curtius, Florus, Tacitus, and ſome other Latin authors; and died in 1660.

FRENCH, in general, ſomething belonging to France: thus we ſay, the French language, French cuſtoms, polity, &c.

The French language is made up of Latin, Greek, Teutonic, and the language ſpoken by the old Gauls. It is natural, and eaſily pronounced; and therefore uſed by moſt nations in Europe in converſing with foreigners. There are very few compound words in French; which is acknowledged to be its diſadvantage. It has alſo few diminutives: but as to purity, eaſineſs, and flexibility, it yields to none.

FRESCO, a method of painting in relievo on walls, ſo as to endure the weather.

It is performed with water-colours on freſh plaſter, or on a wall laid with mortar not yet dry. This ſort of painting has a great advantage by its incorporating with the mortar, and, drying along with it, becomes very durable.

The compoſt ſhould be made of rubbiſh ſtones mixed with well-burnt flint, or lime and water: but the ſaltneſs of the lime muſt be waſhed out, by pouring water frequently on it. But this ſhould not be done in moiſt weather.

To prevent the plaſter from peeling, ſtrike into the joints of the wall ſtumps of horſe-nails ſix inches diſtant from each other. Firſt plaſter the walls pretty thick; then let it dry for ſome time, the deſign and colours being firſt ready prepared. This painting is chiefly performed on walls and vaults newly plaſtered with lime and ſand; and the plaſter is only to be put on in proportion as the painting proceeds.

Plaſter the wall a ſecond time, about the thickneſs of half a crown, only ſo much as you intend to work upon; and while it is wet, work the colours therein, which will incorporate with the plaſter ſo as never to waſh out.

The painting muſt be worked with a free hand, and your colours made high enough at firſt, as there can be no alteration made after the firſt painting.

In this work ſcarce any thing elſe is uſed but earths, which ſtill retain their colour, defending it from the burning and ſalt of the lime. The colours are white, made of lime ſlacked ſome time, and white marble duſt, red and yellow oker, violet red, verditer, lapis lazuli, ſmalt, black Spaniſh brown, Spaniſh white, &c. all which are grounded and worked up with water.

The bruſhes and pencils for this work muſt be long and ſoft, or elſe they will rake and raze the painting: the colours muſt be full and flowing from the bruſh, and the deſign or cartoon muſt be perfect in the paper-copy.

FRESNOY (Charles Alphonſe du), an excellent poet and painter, was born at Paris in 1611. He was inſtructed there by Perrier and Simon Vouet, but did not long adhere to Vouet's manner of colouring; for as ſoon as he fixed himſelf at Rome, he made the works of Titian the models for his imitation. He was, however, more celebrated as a poet than as a painter; and beſtowed more attention to the theory than to the practice of the pencil. Accordingly, he is better known by his incomparable poem *De arte graphica,* than by his performances on the canvas: and on this poem he beſtowed ſo much pains, that he died in 1665, before it was publiſhed. It was printed afterward, with a French proſe tranſlation and notes, by M. de Piles; and was tranſlated into Engliſh by Mr Dryden, who prefixed to it an original preface containing a parallel between painting and poetry.

FRET, or Frette, in architecture, a kind of knot or ornament, conſiſting of two liſts or ſmall fillets variouſly interlaced or interwoven, and running at parallel diſtances eqnal to their breadth.

Fret, in heraldry, a bearing compoſed of ſix bars, croſſed, and variouſly interlaced. Some call it the *true-lover's knot.* See Hrraldry.

Fret, in muſic, ſignifies a kind of ſtop on ſome inſtruments, particularly baſs-viols and lutes. Frets conſiſt of ſtrings tied round the neck of the inſtrument, at certain diſtances, within which ſuch and ſuch notes are to be found.

Fret-*Work,* that adorned with frets. It is ſometimes uſed to fill up and enrich flat empty ſpaces; but it is moſtly practiſed in roofs, which are fretted over with plaſter work.

FRIABLE, among naturaliſts, an appellation given to bodies that are eaſily crumbled to pieces: ſuch are pumice and all calcined ſtones.

FRIAR, a term common to all monks of all orders; founded on this, that there is a kind of fraternity, or brotherhood, between the ſeveral religious perſons of the ſame convent or monaſtery.

Friars are generally diſtinguiſhed into theſe four principal branches, *viz.* 1. Minors, grey friars, or franciſcans. 2. Auguſtines. 3. Dominicans, or black friars. 4. White friars, or carmelites. From theſe four the reſt of the orders deſcend. See Franciscans, Augustines, &c.

FRIBURG, a large town of Germany, and capital of Briſgaw; remarkable for the ſteeple of the great church, which, next to that of Straſburg, is the fineſt in Germany; and for its univerſity. The inhabitants are famous for poliſhing cryſtal and precious ſtones. It has been ſeveral times taken and retaken, particularly by the French in 1744, who demoliſhed the fortifications. It is ſeated on the river Triſer, ten miles eaſt of Briſach, and 30 ſouth of Straſburgh. E. Long. 7. 57. N. Lat. 48. 4.

Friburg, a town of Swiſſerland, and capital of the canton of the ſame name. The public buildings, eſpecially the cathedral, are very handſome; and the inhabitants are Papiſts. It is governed in ſpirituals by the biſhop of Lauſanne, who reſides there; and in temporals by a council, over which an avoyer preſides. Its ſituation is very extraordinary; for only the weſtern ſide is near plain ground, and all the reſt is built among rocks and hills. The ſtreets are clean and large; and it is divided into four parts, the town, the city, the off-land or meadow, and the hoſpital. In 1737, the powder-magazine, which contained 750 tons of gunpowder, was ſet on fire by lightning, which did conſiderable damage. It is ſeated on the river Save, in E. Long. 7. 5. N. Lat. 46. 50.

Friburg (the canton of), and one of the 13 republics of Switzerland. It is ſurrounded on all ſides by the canton of Bern. The land is fertile in corn, fruits, and paſtures; and it is ſaid the canton can ſend 18,000 men into the field.

Friburg (the hermitage of); a celebrated hermitage in Switzerland, three miles from the city of Friburg. It is cut in a rock; and contains a church and ſteeple, a veſtry, a kitchen, a large hall, two rooms on each ſide, two pair of ſtairs, and a cellar. The church is 63 feet long, 36 broad, and 22 high. But the moſt wonderful thing of all is the ſteeple, which is 70 feet high above the rock. The chimney of the kitchen is alſo very ſurpriſing, for the paſſage up it is 90 feet in height. This hermitage is ſaid to have been the work of one man with his ſervant, who were employed in it 25 years.

FRICENTI, an epiſcopal town of Italy, in the kingdom of Naples, and in the farther principato, near the river Tripalto, in E. Long. 14. 13. N. Lat. 40. 59.

FRICTION, in mechanics, the rubbing of the parts of the engines and machines againſt each other, by which means a great part of their effect is deſtroyed. See Mechanics.

Friction, in medicine. See (the *Index* ſubjoined to) that article.

FRIDAY, the ſixth day of the week; ſo named of *Freya*, a Saxon deity. By the Romans it was called *dies Veneris*. See Day.

Good-Friday. See Good-*Friday*.

FRIDBURG, an imperial town of Germany, in Wetteravia. It is ſeated on a mountain, in E. Long. 8. 50. N. Lat. 50. 14. It was formerly much more conſiderable than at preſent.

FRIDSTOL, mentioned, in our ancient writers, among the immunities granted to churches, ſignifies a ſeat, chair, or place of peace and ſecurity, where criminals might find ſafety and protection: of theſe there were many in England; but the moſt famous were that at Beverly, and that in St Peter's church at York, granted by charter of king Henry I.

FRIENDSHIP, a ſtate of mutual good-will, or deſire of doing good to each other, betwixt two or more individuals. See Morals, n° 142, 143.

FRIESLAND, one of the united provinces of the Low Countries. It is bounded on the eaſt by the river Lauvers, which parts it from the lordſhip of Groningen, on the ſouth by Overyſſel, on the weſt by the Zuider-Zee, and on the north by the German ocean. It is 30 miles from north to ſouth, and 28 from eaſt to weſt. The land is very fertile in corn and paſture, the horſes are large, and the cows and ſheep prolific. It is divided into three parts; Weſtergo to the weſt, Oſtergo to the eaſt, and Sevenwalden to the ſouth. The iſlands of Sheling, Ameland, and other ſmall ones, are dependent on this province. The principal towns are Leuwarden the capital, Franeker, Dockum, Harlingen, and Staveren.

Frieſland (Eaſt), a province of Germany, in the circle of Weſtphalia, lying near the German ocean. It is bounded on the ſouth by the biſhopric of Munſter. on the eaſt by the county of Oldenburg, on the weſt by the province of Groningen, and on the north by the ſea. It is about 50 miles in length, and 30 in breadth, and was formerly called the *county of Embden*. It is a very fertile country, and feeds a great number of cattle; but it was greatly damaged by an inundation in 1717, and the repair of the dykes coſt an immenſe ſum. The principal towns are Norden, Leer, Eſſens, Whitmunde, and Aurick. Embden was an imperial city, and the principal place in the country; but now belongs to the king of Pruſſia, who bought it of the Dutch.

FRIGATE, in the navy, a light nimble ſhip built for the purpoſes of ſailing ſwiftly. Theſe veſſels mount from 20 to 38 guns, and are eſteemed excellent cruizers.

Formerly the name of *frigate* was only known in the Mediterranean, and applied to a kind of long veſſel navigated in that ſea with ſails and oars. The Engliſh were the firſt who appeared on the ocean with thoſe ſhips, and equipped them for war as well as commerce.

FRIGID, is applied to a jejune ſtyle, that is unanimated by any ornaments, and conſequently without any force or vigour.

FRIGIDITY, in medicine, the ſame with Impotence.

FRIGORIFIC, in phyſiology, ſmall particles of matter, which, according to Gaſſendus and others, being actually and eſſentially cold, and penetrating other bodies, produce in them that quality which we call *cold*. See Cold.

FRILL, in falconry. When a hawk trembles, or ſhivers, they ſay ſhe frills.

FRINGILLA, in ornithology, a genus belonging to the order of paſſeres. The bill is conical, ſtraight, and ſharp-pointed. There are no leſs than 30 ſpecies comprehended under this genus, diſtinguiſhed principally by varieties in their colour. The following are natives of Britain.

Gold-finch.

1. The *carduelis*, or goldfinch, with the quill-feathers red forwards, and the outermoſt without any ſpots; the two outermoſt are white in the middle, as the reſt are at the point. The young bird, before it moults, is grey on the head; and hence it is termed by the bird-catchers a *grey-pate*. There is a variety of goldfinches called by the London bird-catchers a *cheverel*, from the manner in which it concludes its jerk. It is diſtinguiſhed from the common ſort by a white ſtreak, or by two, ſometimes three, white ſpots under the throat. Their note is very ſweet; and they are much eſteemed on that account, as well as for their great docility. Towards winter, they aſſemble in flocks; and feed on ſeeds of different kinds, particularly thoſe of the thiſtle. It is fond of orchards, and frequently builds in an apple or pear tree: its neſt is very elegantly formed of fine moſs, liverworts, and

bents, on the outſide; lined firſt with wool and hair, and then with the goſlin or cotton of the ſallow. It lays five white eggs, marked with deep purple ſpots on the upper end.

This bird ſeems to have been the χρυσομιτρις of Ariſtotle; being the only one that we know of that could be diſtinguiſhed by a golden fillet round its head, feeding on the ſeeds of prickly plants.

2. The *cælebs*, or CHAFFINCH, hath black limbs, and the wings white on both ſides; the three firſt feathers of the tail are without ſpots, but two of the chief are obliquely ſpotted. It has its name from its delighting in chaff.

Chaffinch. This ſpecies entertains us agreeably with its ſong very early in the year, but towards the latter end of ſummer aſſumes a chirping note: both ſexes continue with us the whole year. What is very ſingular in Sweden, the females quit that country in September, migrating in flocks into Holland, leaving their mates behind; in the ſpring they return. In Hampſhire Mr White has obſerved ſomething of this kind; vaſt flocks of females with ſcarcely any males among them. Their neſt is almoſt as elegantly conſtructed as that of the goldfinch, and of much the ſame materials, only the inſide has the addition of ſome large feathers. They lay four or five eggs of a dull white colour, tinged and ſpotted with deep purple.

They are caught in plenty in flight-time; but their neſts are rarely found, though they build in hedges and trees of all ſorts. They make their neſts of moſs and wool, or any thing they can gather up; and have young ones thrice a-year. They are ſeldom bred from the neſt, as being a bird not apt to learn another's ſong, nor to whiſtle; ſo that it is beſt to leave the old ones to bring them up.

The Eſſex finches are generally allowed to be the beſt ſort, both for length of ſong and variety, ending with ſeveral notes that are very pretty. It is an hardy bird, and will live almoſt upon any ſeeds, none coming amiſs to him. He is ſeldom ſubject to diſeaſe, but will be very louſy if not ſprinkled with wine two or three times a-month.

3. The *domeſtica*, or SPARROW, hath the prime feathers of the wings and tail brown, the body variegated with grey and black, and a ſingle white ſtreak on the wings.

Sparrow. Theſe birds are proverbially ſalacious: they breed early in the ſpring; make their neſts under the eaves of houſes, in holes of walls, and very often in the neſts of the martin, after expelling the owner. Linnæus tells us (a tale from Albertus Magnus), that this inſult does not paſs unrevenged: the injured martin aſſembles its companions, who aſſiſt in plaſtering up the entrance with dirt; then fly away, twittering in triumph, and leave the invader to periſh miſerably. See the article BRUTE.

They will often breed in plumb-trees and apple-trees, in old rooks neſts, and in the forks of boughs beneath them.

Siſkin. 4. The *ſpinus*, or SISKIN, hath the prime feathers of the wings yellow in the middle, and the four firſt chief tail-feathers without ſpots; but they are yellow at the baſe, and black at the points.

Mr Willoughby tells us, that this is a ſong-bird: that in Suſſex it is called the *barley-bird*, becauſe it comes to them in barley-ſeed time. We are informed that it viſits theſe iſlands at very uncertain times, like the groſsbeak, &c It is to be met with in the bird-ſhops in London; and being rather a ſcarce bird, ſells at a higher price than the merit of its ſong deſerves: it is known there by the name of the *aberdavine*. The bird-catchers have a notion of its coming out of Ruſſia. Dr Kramer informs us, that this bird conceals its neſt with great art; though there are infinite numbers of young birds in the woods on the banks of the Danube, that ſeem juſt to have taken flight, yet no one could diſcover it.

5. The *linaria*, or LINNET, hath the bottom of the breaſt of a fine blood-red, which heightens as the ſpring advances. Linnet.

Theſe birds are much eſteemed for their ſong: they feed on ſeeds of different kinds, which they peel before they eat: the ſeed of the linum or flax is their favourite food; from whence the name of the linnet tribe. They breed among furze and white thorn: the outſide of their neſt is made with moſs and bents, and lined with wool and hair. They lay five whitiſh eggs, ſpotted like thoſe of the goldfinch.

6. The *cannabina*, or RED-HEADED LINNET, is leſs than the former, and hath a blood-coloured ſpot on the forehead.

It is a common fraud in the bird-ſhops in London, when a male-bird is diſtinguiſhed from the female by a red breaſt, as in the caſe of this bird, to ſtain or paint the feathers, ſo that the deceit is not eaſily diſcovered, without at leaſt cloſe inſpectiou. Theſe birds are frequent on our ſea-coaſts; and are often taken in flight-time near London: it is a familiar bird; and is cheerful in five minutes after it is caught.

7. The *canaria*, or CANARY-BIRD, hath a whitiſh body and bill, with the prime feathers of the wings and tail greeniſh. Canary-bird. It was originally peculiar to thoſe iſles to which it owes its name; the ſame that were known to the ancients by the addition of the *fortunate*. Though the ancients celebrate the iſle of Canaria for the multitude of birds, they have not mentioned any in particular. It is probable, then, that our ſpecies was not introduced into Europe till after the ſecond diſcovery of theſe iſles, which was between the 13th and 14th centuries. We are uncertain when it firſt made its appearance in this quarter of the globe. Belon, who wrote in 1555, is ſilent in reſpect to theſe birds: Geſner is the firſt who mentions them; and Aldrovand ſpeaks of them as rarieties; that they were very dear on account of the difficulty attending the bringing them from ſo diſtant a country, and that they were purchaſed by people of rank alone. Olina ſays, that in his time there was a degenerate ſort found on the iſle of Elba, off the coaſt of Italy, which came there originally by means of a ſhip bound from the Canaries to Leghorn, and was wrecked on that iſland. Theſe birds will produce with the goldfinch and linnet; and the offſpring is called a *mule-bird*, becauſe, like that animal, it proves barren. They are ſtill found on the ſame ſpot to which we were firſt indebted for the production of ſuch charming ſongſters; but they are now become ſo numerous in our own country, that we are under no neceſſity of croſſing the ocean for them.

FRIPPERY, a French term ſometimes uſed in our language to ſignify the trade or traffic of old ſecond-hand clothes and goods. The word is alſo uſed for the place where ſuch ſort of commerce is carried on, and even for the commodities themſelves. The company of frippiers, or fripperers, at Paris, are a regular corporation, of an ancient ſtanding, and make a conſiderable figure in that city.

FRITT, a mixture of ſeveral ſubſtances intended to be fuſed together for the purpoſe of making glaſs. After theſe ſubſtances have been mixed together, they are generally expoſed during a certain time to a more or leſs ſtrong heat, which is, however, incapable of completely fuſing them. The intention of this operation is either to effect a ſlight union betwixt theſe matters, or to free them more perfectly from any inflammable or extraneous matter, by this calcination.

FRITH, in its moſt uſual acceptation, ſignifies an arm of the ſea; ſuch are the Frith of Forth or of Edinburgh, the Frith of Clyde, Murray Frith, &c.

FRITILLARIA, FRITILLARY; a genus of the monogynia order, belonging to the hexandria claſs of plants. There are five ſpecies, all of them bulbous-rooted flowery perennials, producing annual ſtalks from about one foot to a yard or more high, terminated by large, bell-ſhaped, liliaceous flowers, of a great variety of colours. They are all propagated by offſets, which they furniſh abundantly from the ſides of their roots, and which may be ſeparated every ſecond or third year; they are hardy plants, and will thrive in any of the common borders.

FRIULI, a province of Italy, ſubject to Venice, and bounded by Carinthia in Germany on the north, by Carniola on the eaſt, by the Gulph of Venice on the ſouth, and by the Belluneſe and Feltrin on the weſt.

FRIZING *of* CLOTH, a term in the woollen manufactory, applied to the forming of the nap of cloth, or ſtuff, into a number of little hard burrs or prominences, covering almoſt the whole ground thereof.

Some cloths are only frized on the back ſide, as black cloths; others on the right ſide, as coloured and and mixed cloths, rateens, bays, friezes, &c.

Frizing may be performed two ways; one with the hand, that is, by means of two workmen, who conduct a kind of plank that ſerves for a frizing inſtrument.

The other way is by a mill, worked either by water or a horſe, or ſometimes by men. This latter is eſteemed the better way of frizing, by reaſon the motion being uniform and regular, the little knobs of the frizing are formed more equably and regularly. The ſtructure of this uſeful machine is as follows.

The three principal parts are the frizer or criſper, the frizing table, and the drawer or beam. The two firſt are two equal planks or boards, each about 10 feet long and 15 inches broad; differing only in this, that the frizing-table is lined or covered with a kind of coarſe woollen ſtuff, of a rough ſturdy nap; and the frizer is incruſtated with a kind of cement compoſed of glue, gum-arabic, and a yellow ſand, with a little aqua-vitæ, or urine. The beam, or drawer, thus called, becauſe it draws the ſtuff from between the frizer and the frizing-table, is a wooden roller, beſet all over with little, fine, ſhort points or ends of wire, like thoſe of cards uſed in carding of wool.

The diſpoſition and uſe of the machine is thus. The table ſtands immoveable, and bears or ſuſtains the cloth to be frized, which is laid with that ſide uppermoſt on which the nap is to be raiſed: over the table is placed the frizer, at ſuch a diſtance from it as to give room for the ſtuff to be paſſed between them: ſo that the frizer, having a very ſlow ſemicircular motion, meeting the long hairs or naps of the cloth, twiſts, and rolls them into little knobs or burrs; while, at the ſame time, the drawer, which is continually turning, draws away the ſtuff from under the frizer, and winds it over its own points.

All that the workman has to do while the machine is a-going, is to ſtretch the ſtuff on the table as faſt as the drawer takes it off, and from time to time to take off the ſtuff from the points of the drawer.

The deſign of having the frizing-table lined with ſtuff of a ſhort, ſtiff, ſtubby nap, is that it may detain the cloth between the table and the frizer long enough for the grain to be formed, that the drawer may not take it away too readily, which muſt otherwiſe be the caſe, as it is not held by any thing at the other end. It were unneceſſary to ſay any thing particular of the manner of frizing ſtuffs with the hand, it being the aim of the workmen to imitate, as near as they can with their wooden inſtrument, the ſlow, equable, and circular motion of the machine: it needs only be added, that their frizer is but about two feet long and one broad; and that to form the nap more eaſily, they moiſten the ſurface of the ſtuff lightly, with water mingled with whites of eggs or honey.

FROBENIUS (John), a famous and learned printer in the 16th century, was born at Hamelburgh in Franconia, and ſettled at Baſil. He had before ſtudied in that univerſity, where he acquired the reputation of being uncommonly learned; and now ſetting up a printing-houſe in that city, was the firſt of the German printers who brought that admirable art to any degree of perfection. Being a man of great probity and piety, as well as ſkill, he was particularly choice in the authors he printed; and would never, for the ſake of profit, ſuffer libels, or any thing that might hurt the reputation of another, to go through his preſs. The great character of this printer was the principal motive which induced Eraſmus to reſide at Baſil, in order to have his own works printed by him. A great number of valuable authors were printed by Frobenius, with great care and accuracy; among which were the works of St Jerome, Auguſtine, and Eraſmus. He deſigned to have printed the Greek Fathers; but died in 1527, before he could execute his deſign. Eraſmus wrote his epitaph in Greek and Latin.

John Frobenius left a ſon, named *Jerome Frobenius*, and a daughter married to Nicholas Epiſcopius; who, joining in partnerſhip, continued Frobenius's printing-houſe with reputation, and printed correct editions of the Greek Fathers.

FROBISHER, or FORBISHER, (Sir Martin), an excellent navigator and ſea-officer in the 16th century, was born near Doncaſter in Yorkſhire, and was from his youth brought up to navigation. He was the firſt Engliſhman who attempted to find a north-weſt paſſage to China; and, in 1576, he ſailed with two barks and a pinnace, in order to attempt that paſſage. In this voyage he diſcovered a cape, to which he gave the name of *Queen Elizabeth's Foreland*, and the next day diſcovered a ſtrait to which he gave his own name. This voyage proving unſucceſsful, he attempted the ſame paſſage in 1577; but diſcovering ſome ore in an iſland, and his commiſſion directing him in this voyage only to ſearch for ore, and to leave the farther diſcovery of the north-weſt to another time, he returned to England. He ſailed again, with 15 ſhips, and a great number of adventurers, to form a ſettlement: but being obſtructed by the ice, and driven out to ſea by a violent ſtorm, they, after encountering many difficulties, returned home, without making any ſettlement, but brought a large quantity of ore.—He afterwards commanded the Aid in Sir Francis's Drake's expedition to the Weſt Indies, in which St Domingo in Hiſpaniola, Carthagena, and Santa Juſtina, in Florida, were taken and ſacked. In 1588, he bravely exerted himſelf in defence of his country, againſt the Spaniſh armada, when he commanded the Triumph, one of the largeſt ſhips in that ſervice; and, as a reward for his diſtinguiſhed bravery, received the honour of knighthood from the lord high-admiral at ſea. He afterwards commanded a ſquadron which was ordered to cruiſe on the Spaniſh coaſt; and, in 1592, took two valuable ſhips and a rich carrack. In 1594, he was ſent to the aſſiſtance of Henry IV. king of France againſt a body of the Leaguers and Spaniards, who had ſtrongly entrenched themſelves at Croyzon near Breſt; but in an aſſault upon that fort, on the 7th of November, Sir Martin was unfortunately wounded with a ball, of which he died ſoon after he had brought back the fleet to Plymouth, and was buried in that town.

FROBISHER's *Straits*, lie a little to the northward of cape Farewell in Weſt Greenland, and were diſcovered by Sir Martin Frobiſher. W. Long. 48. 16. N. Lat. 63. 12.

FROG, in zoology. See RANA.

Bull-FROG. See RANA.

FROG-*Fiſh* of Surinam, a very ſingular animal, of which a figure is given by Mr Edwards, *Hiſt. of Birds*, Vol. I. There is no ſpecimen in the Britiſh muſeum, nor in any private collection, except that of Dr Fothergill. It was brought from Surinam in South America.—Frogs, both in Aſia and Africa, according to Merian, change gradually from fiſhes to frogs, as thoſe in Europe; but after many years revert again into fiſhes, though the manner of their change has never been inveſtigated. In Surinam theſe fiſhes are called *jakjés*. They are cartilaginous, of a ſubſtance like our muſtela, and exquiſite food: they are formed with regular vertebræ, and ſmall bones all over the body divided into equal parts; are firſt darkiſh, and then grey: their ſcales make a beautiful appearance. Whether this animal is, in its perfect ſtate, a ſpecies of frog with a tail, or a kind of water-lizard, Mr Edward's does not pretend to determine; but obſerves, that when its ſize is conſidered, if it ſhould be deemed a tadpole at firſt produced from ſpawn, and in its progreſs towards a frog, ſuch an animal, when full grown, if it bears the ſame proportion to its tadpole as thoſe in Europe do, muſt be of enormous ſize; for our full-grown frogs exceed the tadpoles at leaſt 50 times. See a reduced figure on Plate CV.

FRONDESCENTIA, from *frons*, a "leaf;" the preciſe time of the year and month in which each ſpecies of plants unfolds its firſt leaves.

All plants produce new leaves every year; but all do not renew them at the ſame time. Among woody plants, the elder, and moſt of the honey-ſuckles; among perennial herbs, crocus and tulip, are the firſt that puſh or expand their leaves. The time of ſowing the ſeeds decides with reſpect to annuals. The oak and aſh are conſtantly the lateſt in puſhing their leaves: the greateſt number unfold them in ſpring; the moſſes and firs in winter. Theſe ſtriking differences with reſpect to ſo capital a circumſtance in plants as that of unfolding their leaves, ſeem to indicate that each ſpecies of plants has a temperature proper or peculiar to itſelf, and requires a certain degree of heat to extricate the leaves from their buds, and produce the appearance in queſtion.

This temperature, however, is not ſo fixed or conſtant as it may appear to a ſuperficial obſerver. Among plants of the ſame ſpecies, there are ſome more early than others; whether that circumſtance depends, as it moſt commonly does, on the nature of the plants, or is owing to differences in heat, expoſure, and ſoil. In general, it may be affirmed, that ſmall and young trees are always earlier than larger or old ones.

The puſhing of the leaves is likewiſe accelerated or retarded according to the temperature of the ſeaſon; that is, according as the ſun is ſooner or later in diſpenſing that certain degree of heat which is ſuitable to each ſpecies.

FRONTINUS (Sextus Julius), an ancient Roman writer, was of conſular dignity, and flouriſhed under the emperors Veſpaſian, Titus, Domitian, Nerva, and Trajan. He commanded the Roman armies in Britain; was made city-prætor when Veſpaſian and Titus were conſuls; and Nerva made him curator of the aqueducts, which occaſioned his writing *De aquæductibus urbis Romæ*. He wrote four books upon the Greek and Roman art of war; a piece *De re agraria*, and another *De limitibus*. Theſe have been often ſeparately reprinted; but were all collected together in a neat edition at Amſterdam in 1661, with notes by Robertus Keuchenius. He died under Trajan.

FRONTISPIECE, in architecture, the portrait or principal face of a building. See ARCHITECTURE.

FRONTISPIECE, is alſo uſed to ſignify an ornament fronting the title-page of a book, which, in ſome meaſure, ſhould expreſs the ſubject treated of.

FRONTO (Marcus Cornelius), was choſen for his eloquence to inſtruct the emperors Marcus Aurelius and Lucius Verus in rhetoric; in recompence of which he was promoted to the conſulate, and a ſtatue was erected to his honour. He taught Marcus Aurelius not only eloquence, but the duty of kings, and excellent morals. Some ſay he wrote againſt the Chriſtians. A ſect was formed of thoſe who looked upon him as a model of perfect eloquence, and theſe were called *Frontoniani*. The Civilians, whoſe names were *Fronto*, mentioned in the pandects, were probably deſcended from him.

FROST, in phyſiology, ſuch a ſtate of the atmoſphere as occaſions the congelation or freezing of water and other fluids. See CONGELATION.

Under the articles COLD, CONGELATION, EVAPORA-

PORATION, FLUIDITY, &c. it is ſhewn, that water and other fluids are capable of containing the element of fire, or heat, in two very different ſtates. In the one, they ſeem to imbibe the fire in ſuch a manner, that it eludes all the methods by which we are accuſtomed to obſerve it, either by our ſenſation of feeling, or the thermometer; in the other, it manifeſts itſelf obviouſly to our ſenſes, either by the touch, the thermometer, or the emiſſion of light.

In the firſt of theſe ſtates, we call the body *cold;* and are apt to ſay that this coldneſs is occaſioned by the *abſence* of heat. But this manner of expreſſing ourſelves is certainly improper; for, even thoſe fluids which are coldeſt to the touch, contain a vaſt deal of heat. Thus, vapour, which is colder to the touch than the water from which it was raiſed, contains an immenſe quantity of fire, even more than ſufficient to heat it red hot. The like may be ſaid of common ſalt, and ſnow, or ice. If a quantity of each of theſe ſubſtances is ſeparately reduced to the degree of 28 or 30 of Fahrenheit's thermometer, upon mixing them together, the heat which would have raiſed the thermometer to the degree abovementioned, now enters into the ſubſtance of them in ſuch a manner that the mercury falls down to 0.—Here an exceſſive degree of cold is produced, and yet we are ſure that the ſubſtances contain the very ſame quantity of heat that they formerly did: nay, they will even ſeem exceedingly cold, when they moſt certainly contain a great deal more heat than they originally did; for they abſorb it from all bodies around them; and if a ſmall veſſel full of water is put in the middle of ſuch a mixture, it will in a ſhort time be full of ice.

It appears, therefore, that our ſenſes, even when aſſiſted by thermometers, can only judge of the ſtate in which the element of fire is with relation to the bodies around us, without regard to the quantity contained in them. Thus, if heat flows from any part of our body into any ſubſtance actually in contact with it, the ſenſation of cold is excited, and we call that ſubſtance *cold;* but if it flows from any ſubſtance into our body, the ſenſation of heat is excited, and we call that ſubſtance *hot,* without regard to the abſolute quantity contained in either caſe. See HEAT.

Of all known ſubſtances, the atmoſphere either abſorbs or throws out heat with the moſt remarkable facility: and in one or other of theſe ſtates it always is with reſpect to the ſurface of the earth, and ſuch bodies as are placed on or near it; for theſe, properly ſpeaking, have no temperature of their own, but are entirely regulated by that of the atmoſphere.—When the air has been for ſome time abſorbing the heat from terreſtrial bodies, a froſt muſt be the undoubted conſequence, for the ſame reaſon that water freezes in a veſſel put into a freezing mixture; and were this abſorption to continue for a length of time, the whole earth would be converted into a frozen maſs. There are, however, certain powers in nature, by which this effect is always prevented; and the moſt violent froſt we can imagine, muſt always as it were defeat its own purpoſes, and end in a thaw. To underſtand this ſubject, we muſt obſerve,

1. In that ſtate of the atmoſphere which we denominate froſt, there is a moſt intimate union between the air and the water it contains; and therefore froſty weather, except in very high latitudes, is generally clear.

2. When ſuch an union takes place, either in winter or ſummer, we obſerve the atmoſphere alſo inclined to abſorb heat, and conſequently to froſt. Thus in clear ſettled weather, even in ſummer, though the day may be exceſſively hot, by reaſon of the continued ſunſhine, yet the mornings and evenings are remarkably cold, and ſometimes even diſagreeably ſo.

3. The air being, therefore, always ready in the time of froſt, or in clear weather, to abſorb heat from every ſubſtance which comes into contact with it, it follows that it muſt alſo abſorb part of that which belongs to the vapours contained in it.

4. Though vapour is capable of becoming much colder than water without being frozen, yet by a continued abſorption it muſt at laſt part with its latent heat, *i. e.* that which eſſentially conſtitutes it vapour; and without which it is no longer vapour, but water or ice. No ſooner, therefore, does the froſt arrive at a certain pitch, than the vapours, every where diſperſed through the air, give out their latent heat: the atmoſphere then becomes clouded; the froſt either totally goes off, or becomes milder by reaſon of the great quantity of heat diſcharged into the air; and the vapours deſcend in rain, hail, or ſnow, according to the particular diſpoſition of the atmoſphere at the time.

5. Even in the polar regions, where it may be thought that the froſt muſt increaſe beyond meaſure, there are alſo natural means for preventing its running to extremes. The principal cauſe here is, the mixture of a great quantity of vapours from the more temperate regions of the globe with the air in thoſe dreary climates. It is well known, that aqueous vapour always flies from a warm to a colder place. For this reaſon, the vapours raiſed by the ſun in the more temperate regions of the earth, muſt continually travel northward and ſouthward in great quantities. Thus they furniſh materials for thoſe immenſe quantities of ſnow and ice which are to be found in the neighbourhood of the poles, and which we cannot imagine the weak influence of the ſun in theſe parts capable of raiſing. It is impoſſible that a quantity of vapour can be mixed with froſty air, without communicating a great deal of heat to it; and thus there are often thaws of conſiderable duration even in thoſe climates where, from the little influence of the ſun, we ſhould ſuppoſe the froſt would be perpetual.

6. We may now account with ſome probability for the uncertain duration of froſts. In this country they are ſeldom of a long continuance; becauſe the vapours raiſed from the ſea with which our iſland is ſurrounded, perpetually mix with the air over the iſland, and prevent a long duration of the froſt. For the ſame reaſon, froſts are never of ſuch long duration in maritime places on the continent, as in the inland ones. There is nothing, however, more uncertain than the motion of the vapours with which the air is conſtantly filled, and therefore it is impoſſible to prognoſticate the duration of a froſt with any degree of certainty. In general, we may always be certain, that if a quantity of vapour is accumulated in any place, no intenſe froſt can ſubſiſt in that place for any length of time; and by whatever cauſes the vapours are driven from place to place, by the ſame cauſes the froſts are regulated

throughout the whole world. See THAW, VAPOUR, &c.

The effects of froſt in ſeveral different countries, are enumerated under the article CONGELATION. In the northern parts of the world, even ſolid bodies are liable to be affected by froſt. Timber is often apparently frozen, and rendered exceedingly difficult to ſaw. Marle, chalk, and other leſs ſolid terreſtial concretions, will be ſhattered by ſtrong and durable froſts. Metals are contracted by froſt: thus, an iron tube, 12 feet long, upon being expoſed to the air in a froſty night, loſt two lines of its length. On the contrary, froſt ſwells or dilates water near one tenth of its bulk. Mr Boyle made ſeveral experiments with metalline veſſels, exceedingly thick and ſtrong; which being filled with water, cloſe ſtopped, and expoſed to the cold, burſt by the expanſion of the frozen fluid within them. Trees are frequently deſtroyed by froſt, as if burnt up by the moſt exceſſive heat; and in very ſtrong froſts, walnut-trees, aſhes, and even oaks, are ſometimes ſplit and cleft, ſo as to be ſeen through, and this with a terrible noiſe, like the exploſion of fire-arms.

Froſt naturally proceeds from the upper parts of bodies downwards: but how deep it will reach in earth or water, is not eaſily known; becauſe this depth may vary with the degree of coldneſs in the air, by a longer or ſhorter duraton of the froſt, the texture of the earth, the nature of the juices wherewith it is impregnated, the conſtitution of its more internal parts as to heat and cold, the nature of its effluvia, &c. Mr Boyle, in order to aſcertain this depth, after four nights of hard froſt, dug in an orchard, where the ground was level and bare, and found the froſt had ſcarce reached three inches and a half, and in a garden nearer the houſe only two inches, below the ſurface. Nine or ten ſucceſſive froſty nights froze the bare ground in the garden ſix inches and a half deep; and in the orchard, where a wall ſheltered it from the ſouth ſun, to the depth of eight inches and a half. He alſo dug in an orchard, near a wall, about a week afterwards, and found the froſt to have penetrated to the depth of 14 inches. In a garden at Moſcow, the froſt in a hard ſeaſon only penetrates to two feet: and the utmoſt effect that Captain JAMES mentions the cold to have had upon the ground of Charlton iſland, was to freeze it to 10 feet deep: whence may appear the different degrees of cold of that iſland and Ruſſia. And as to the freezing of water at the abovementioned iſland, the Captain tells us, it does not naturally congeal above the depth of ſix feet, the reſt being by accident. Water alſo, expoſed to the cold air in large veſſels, always freezes firſt at the upper ſurface, the ice gradually increaſing and thickening downwards: for which reaſon, frogs retire in froſty weather to the bottom of ditches; and it is ſaid, that ſhoals of fiſh retire in winter to thoſe depths of the ſea and rivers, where they are not to be found in ſummer. Water, like the earth, ſeems not diſpoſed to receive any very intenſe degree of cold at a conſiderable depth or diſtance from the air. The vaſt maſſes of ice found in the northern ſeas being only many flakes and fragments, which, ſliding under each other, are, by the congelation of the intercepted water, cemented together.

In cold countries, the froſt often proves fatal to mankind; not only producing gangrenes, but even death itſelf. Thoſe who die of it have their hands and feet firſt ſeized, till they grow paſt feeling it; after which the reſt of their bodies is ſo invaded, that they are taken with a drowſineſs, which if indulged, they awake no more, but die inſenſibly. But there is another way whereby it proves mortal, *viz.* by freezing the abdomen and viſcera, which on diſſection are found to be mortified and black.

Hoar-FROST, a cold moiſt vapour, that is drawn up a little way into the air, and in the night falls again on the earth, where it is congealed into icy cryſtals of various figures. Hoar-froſt, therefore, is nothing but dew turned into ice by the coldneſs of the air.

Melioration of Aromatic Spirits by FROST. Mr Baume obſerves, that aromatic ſpirituous waters have leſs ſcent when newly diſtilled than after they have been kept about ſix months: and he found that the good effects of age was produced in a ſhort time by means of cold; and that, by plunging quart-bottles of the liquor into a mixture of pounded ice and ſea-ſalt, the ſpirit, after having ſuffered for ſix or eight hours the cold hence reſulting, proves as grateful as that which hath been kept many years. Simple waters alſo, after having been frozen, prove far more agreeable than they were before. Geoffroy takes notice of this melioration by froſt; *Hiſt. Acad.* 1713.

Melioration of Land by FROST. See AGRICULTURE, n° 30.

FROST-*Bitten.* See (the *Index* ſubjoined to) MEDICINE.

FROTH, a white, light ſubſtance, formed on the ſurface of fluids, by vehement agitation, conſiſting of little ſpherules or globules.

FROTH-*Spit*, or *Cuckow-Spit*, a name given to a white froth, or ſpume, very common in the ſpring and firſt months of ſummer, on the leaves of certain plants, particularly on thoſe of the common white field-lychnis or catch-fly, thence called by ſome *ſpatling poppy*.

All writers on vegetables have taken notice of this froth, though few have underſtood the cauſe or origin of it till of late. It is formed by a little leaping animal, called by ſome the *flea graſs-hopper*, by applying its anus cloſe to the leaf, and diſcharging thereon a ſmall drop of a white viſcous fluid, which, containing ſome air in it, is ſoon elevated into a ſmall bubble: before this is well formed, it depoſits ſuch another drop; and ſo on, till it is every way overwhelmed with a quantity of theſe bubbles, which form the white frot which we ſee. Within this ſpume it is ſeen to acquire four tubercles on its back, wherein the wings are inclocloſed: theſe burſting, from a reptile it becomes a winged animal: and thus, rendered perfect, it flies to meet its mate, and propagate its kind. It has an oblong, obtuſe body, and a large head with ſmall eyes. The external wings, for it has four, are of a duſky brown colour, marked with two white ſpots: the head is black. It is a ſpecies of CICADA.

FRUCTESCENTIA, (from *fructus*, "fruit,") comprehends the preciſe time in which, after the fall of the flowers, the fruits arrive at maturity, and diſperſe their ſeeds.

In general, plants which flower in ſpring, ripen their fruits in ſummer, as rye; thoſe which flower in ſummer, have their fruits ripe in autumn, as the vine; the fruit of autumnal flowers ripens in winter, or the following ſpring, if kept in a ſtove or otherwiſe defended from exceſſive froſts. Theſe froſts, ſays M. Adanſon, are frequently ſo pernicious and violent as to deſtroy the greateſt part of the perennial plants of Virginia and Miſſiſſippi, that are cultivated in France, even before they have exhibited their fruit. The plants which flower during our winter, ſuch as thoſe of the Cape of of Good Hope, ripen their fruit in ſpring in our ſtoves.

FRUCTIFEROUS, ſignifies properly any thing that produces fruit.

FRUCTIFICATION, among botaniſts, in a more lax ſenſe, includes the flower and fruit, with their ſeveral coverings. See FRUCTUS.

FRUCTUS, in botany, the FRUIT, is defined by Jungius and former botaniſts to be an annual part of the plant, which adheres to the flower and ſucceeds it; and, after attaining maturity, ſeparates or detaches itſelf from the parent plant; and, being commodiouſly lodged in the boſom of the earth, gives birth to a new vegetable. This definition is ſufficiently accurate, and ſo perſpicuous, that it requires no illuſtration whatever. We ſhall only obſerve, that, in its vulgar acceptation, the word *fruit* is expreſſive, not of the ſeeds, which are doubtleſs the eſſence of every fruit; but of the caſe or veſſel in which they are contained. Thus, when we ſpeak of the fruit of an apple-tree, we always mean the luſcious pulp which enfolds the ſeeds; although that, in ſtrict propriety, is only the cover of the fruit.

Colours Extracted from FRUITS. See the article COLOUR-*Making*, n° 35.

FRUIT-*Flies*, a name given by gardeners and others to a ſort of ſmall black flies found in vaſt numbers among fruit trees, in the ſpring ſeaſon, and ſuppoſed to do great injury to them. Mr Lewenhoek preſerved ſome of theſe flies for his microſcopical obſervations. He found that they did not live longer than a day or two, but that the females during this time laid a great number of longiſh eggs. The gardeners who ſuppoſe that theſe flies wound the leaves of the trees, are miſtaken: it is true that they feed on their juices; but they have no inſtruments wherewith they can extract theſe for themſelves: they feed on ſuch as are naturally extravaſated; and when there is not a ſufficient quantity of theſe for their purpoſe, they haunt the places to which the pucerons reſort, and feed on the juices which theſe little creatures extravaſate by means of the holes they bore in the leaves with their trunks.

FRUIT-*Stones*. The miſchiefs ariſing from the cuſtom which many people have of ſwallowing the ſtones of plums and other fruit are very great. The Philoſophical Tranſactions give an account of a woman who ſuffered violent pains in her bowels for 30 years, returning once in a month or leſs. At length, a ſtrong purge being given her, the occaſion of all theſe complaints was driven down from the bowels to the anus; where it gave a ſenſation of diſtenſion and ſtoppage, producing a continual deſire of going to ſtool, but without voiding any thing. On the aſſiſtance of a careful hand in this caſe, there was taken out with a forceps, a ball of an oval figure, of about ten drachms in weight, and meaſuring five inches in circumference. This had cauſed all the violent fits of pain which ſhe had ſuffered for ſo many years; and, after voiding it, ſhe became perfectly well. The ball extracted looked like a ſtone, and felt very hard, but it ſwam in water. On cutting it through with a knife, there was found in the centre of it a plum-ſtone; round which, ſeveral coats of this hard and tough matter had gathered. Another inſtance given in the ſame papers is of a man, who, dying of an incurable colic which had tormented him many years, and baffled the effects of medicines, was opened after death; and in his bowels was found a ball ſimilar to that abovementioned; but ſomewhat larger, being ſix inches in circumference, and weighing an ounce and an half. In the centre of this, as of the other, there was found the ſtone of a common plum, and the coats were of the ſame nature with thoſe of the former.

Theſe and ſeveral other inſtances mentioned in the ſame place, ſufficiently ſhew the folly of that common opinion that the ſtones of fruits are wholeſome. For though by nature the guts are ſo defended by their proper mucus, that people very ſeldom ſuffer by things of this kind; yet if we conſider the various circumvolutions of the guts, their valves and cells, and at the ſame time conſider the hair of the ſkins of animals we feed on, the wool or down on herbs and fruit, and the fibres, veſſels, and nerves of plants, which are not altered by the ſtomach; it will appear a wonder that inſtances of this ſort of miſchief are not much more common. Cherry-ſtones, ſwallowed in great quantities, have occaſioned the death of many people; and there have been inſtances even of the ſeeds of ſtrawberries collecting into a lump in the guts, and cauſing violent diſorders, which could not be cured without great difficulty.

FRUIT-*Trees*. With regard to theſe it may be obſerved, 1. That the cutting and pruning them when young, ſcrimp their bearing, though it contributes to the richneſs and flavour of the fruit, as well as to the beauty of the tree. 2. That kernel-fruit trees come later to bear than ſtone-fruit trees: the time required by the firſt before they come to any fit age for bearing, being one with another five years; but when they do begin, they bear in greater plenty than ſtone-fruit. 3. That ſtone-fruit, figs, and grapes, commonly bear conſiderably in three or four years, and bear full crops the fifth and ſixth years; and hold it for many years, if well ordered. 4. That fruit-trees in the ſame neighbourhood will ripen a fortnight ſooner in ſome grounds, than in others of a different temperature. 5. That, in the ſame country, hot or cold ſummers ſet conſiderably forwards, or put backwards, the ſame fruit. 6. That the fruit on wall-trees generally ripen before thoſe on ſtandards, and thoſe on ſtandards before thoſe on dwarfs. 7. That the fruit of all wall-trees planted in the ſouth and eaſt quarters, commonly ripen about the ſame time, only thoſe in the ſouth rather earlier than thoſe in the eaſt; thoſe in the weſt are later by eight or ten days; and thoſe in the north, by 15 or 20. For the planting, pruning, grafting, &c. of fruit-trees, ſee the articles PLANTING, TRANSPLANTING, PRUNING, GRAFTING, ORCHARD, NURSERY, &c.

FRUITERY, a place for the keeping of fruit, a fruit-houſe, or fruit-loft.

A fruitery ſhould be inacceſſible to any thing of moiſture; and ſhould be as much as poſſible ſo, even to froſt.

FRUMENTACEOUS, a term applied by botaniſts to all ſuch plants as have a conformity with wheat, in reſpect of their fruits, leaves, ears, or the like.

FRUMENTARII, a kind of ſoldiers, or archers, under the weſtern empire.

The firſt time we read of theſe officers is in the reign of the emperor Adrian, who made uſe of them to inform himſelf of whatever paſſed. They did not make any particular corps diſtinct from the reſt of the forces, but there was a certain number of them in each legion. It is ſuppoſed, that they were at firſt a number of young perſons, diſpoſed by Auguſtus throughout the provinces, particularly on all the grand roads, to acquaint the emperor, with all expedition, of every thing that happened.

Afterwards they were incorporated into the troops themſelves, where they ſtill retained their ancient name. As their principal office was the giving intelligence, they were often joined with the curioſi, with whom they agreed in this part of their office.

Their name of *frumentarii* is derived from their being alſo a ſort of purveyors to the armies, cities, &c. collecting all the corn from the ſeveral provinces to furniſh the commonwealth.

FRUMENTATION, in Roman antiquity, a largeſs of corn beſtowed on the people. This practice of giving corn to the people was very ancient among the Romans, and frequently uſed to ſoothe the turbulent humour of the populace. At firſt the number of thoſe to whom this largeſs was given was indeterminate, till Auguſtus fixed it at 200,000.

FRUSH, or RUNNING-THRUSH. See FARRIERY, §. xliv.

FRUSTUM, in mathematics, a part of ſome ſolid body ſeparated from the reſt.

The fruſtum of a cone is the part that remains, when the top is cut off by a plane parallel to the baſe; and is otherwiſe called a *truncated cone*. See CONIC *Sections*.

The fruſtum of a pyramid is alſo what remains after the top is cut off by a plane parallel to its baſe.

The fruſtum of a globe or ſphere is any part thereof cut off by a plane, the ſolid contents of which may be found by this rule: To three times the ſquare of the ſemidiameter of the baſe, add the ſquare of its height; then multiply that ſum by the height, and this product multiplied by .5236 gives the ſolidity of the fruſtum.

FRUTEX, a SHRUB. Shrubs, according to Linnæus, make a branch of the ſeventh family in the vegetable kingdom; and are diſtinguiſhed from trees, in that they come up without buds. But this diſtinction is not univerſal, though it be generally juſt with regard thoſe of Europe. Nature hath made no abſolute diſtinction between trees and ſhrubs. *Frutex*, in its general acceptation, is a plant whoſe trunk is perennial, gemmiparous, woody, dividing and ſubdividing into a great number of branches. In ſhort, it is the epitome of a tree, exemplified in the roſe-buſh.

FRYTH (John), a martyr to the Proteſtant religion in the reign of Henry VIII. He was the ſon of an inn-keeper at Seven-oaks in Kent; and educated in the king's college, Cambridge, where he took the degree of bachelor of arts. . Thence he removed to Oxford, and was made a junior canon of Wolſey's college. He had not been long in this univerſity, before he became acquainted with William Tyndale, a zealous Lutheran, with whom he converſed frequently on the abuſes in religion. Fryth became a convert to Lutheraniſm, and publicly avowed his opinions. He was apprehended, examined by the commiſſary, and confined to his college. At length, having obtained his liberty, in 1528 he went over to Germany, where he continued about two years; and then returned to England, more than ever determined in his religious ſentiments. Finding at that time but few aſſociates, he wandered about from place to place, till at laſt he was taken up at Reading as a vagrant, and ſet in the ſtocks, where he remained till he was near expiring for want of ſuſtenance. He was at length relieved by the humanity of Leonard Cox, a ſchoolmaſter; who finding him a man of letters, procured his enlargement, and adminiſtered to his neceſſities. Fryth now ſet out for London, where, with more zeal than prudence, he began to make proſelytes; but was ſoon apprehended by order of the chancellor Sir Thomas More, and ſent priſoner to the Tower. Refuſing to recant his opinions, he was condemned to the flames, and accordingly burnt in Smithfield, on the fourth of July 1533. He left ſeveral works behind him, which were printed in folio in 1573.

FUAGE, in old Engliſh writers, a tax of 12d. for every fire, levied in the time of Edward III.

FRY, in zoology, ſignfies the ſpawn, or rather young, of fiſh.

FUCUS, in botany, a genus of ſubmarine plants, belonging to the cryptogmia claſs.

The fucus conſiſts of a tough matter, formed into a kind of leaves, which are flat and variouſly divaricated; and which have ſome appearance of fructification, in punctated tubercles, covering oblong veſicles, ſuppoſed by Linnæus to be male flowers; and ſmooth roundiſh veſicles, hollow and interwoven with filaments, which appear to him to be female flowers. There are 34 ſpecies of fucus, or ſea-wrack, many of them to be found on our coaſts.

The ancients uſed a purple ſea-plant to dry woollen and linen things of that colour, and called it *fucus*. The dye was very beautiful, but not laſting; for it ſoon began to change, and in time went wholly off. This is the account Theophraſtus gives of it.

The women of thoſe times alſo uſed ſomething called *fucus*, to ſtain their cheeks red; and many have ſuppoſed, from the ſame word expreſſing both, that the ſame ſubſtance was uſed on both occaſions. But this, on a ſtrict inquiry, proves not to be the caſe. The Greeks called every thing *fucus*, that would ſtain or paint the fleſh. But this peculiar ſubſtance uſed by the women to paint their cheeks was diſtinguiſhed from the others by the name of *rizion* among the more correct writers, and was indeed a root brought from Syria into Greece. The Latins, in imitation of the Greek name, called this root *radicula*, and Pliny very erroneouſly confounds the plant with the *radix lunaria*, or *ſtruthion* of the Greeks.

The word *fucus* was in thoſe times become ſuch an univerſal name for paint, that the Greeks and Romans had a *fucus metallicus*, which was the ceruſs uſed for painting the neck and arms white; after which they uſed the *purpuriſſum*, or red fucus of the *rizium*, to give the colour to the cheeks. In after-times they alſo uſed a peculiar *fucus* or paint for this purpoſe; prepared of the *Creta argentaria*, or ſilver-chalk, and ſome of the rich purple dyes that were in uſe at that time: and this ſeems to have been very little different from our roſe-pink; a colour commonly ſold at the colour-ſhops, and uſed on like occaſions.

FUEGO, or Fogo, one of the Cape de Verd iſlands, in the Atlantic ocean. It is much higher than any of the reſt; and ſeems, at ſea, to be one ſingle mountain, though on the ſides there are deep valleys. There is a volcano at the top, which burns continually, and may be ſeen a great way off at ſea. It vomits a great deal of fire and ſmoke, and throws out huge pieces of rock to a vaſt height; and ſometimes torrents of melted matter run down the ſides. The Portugueſe, who firſt inhabited it, brought negro ſlaves with them, and a ſtock of cows, horſes, and hogs; but the chief inhabitants now are blacks, of the Romiſh religion. W. Long. 24. 47. N. Lat. 15. 20.

FUEL, whatever is proper to burn or make a fire; as wood, turf, peat, bituminous earths, coal, &c.

FUGALIA, in Roman antiquity, a feaſt ſuppoſed by ſome to be the ſame with the *refugium*, held on the 24th of February, in memory of the expulſion of the kings, and the aboliſhing of monarchical government. Others again diſtinguiſh the fugalia from the regifuge. And others think, that the fugalia was the ſame with the *poplifugia*, or the feaſt of Fugia, the goddeſs of joy, occaſioned by the rout of an enemy, which was the reaſon the people abandoned themſelves to riot and debauchery.

FUGITIVE, a perſon obliged to fly his country, or remove from a place where he had ſome abode or eſtabliſhment, on account of his crimes, debts, or other occaſions.

FUGUE, in muſic, (from the Latin *fuga*, a "chaſe:") A piece of muſic, ſometimes longer and ſometimes ſhorter, in which, agreeable to the rules of harmony and modulation, the compoſer treats a ſubject; or, in other words, what expreſſes the capital thought or ſentiment of the piece, in cauſing it to paſs ſucceſſively and alternately from one part to another,

Theſe are the principal rules of the fugue; of which ſome are peculiar to itſelf, and others common to it with what the French call *imitation*.

1. The ſubject proceeds from the tonic to the dominant, or from the dominant to the tonic, in riſing or deſcending.

2. Every fugue finds its reſponſe in the part immediately following that which commenced.

3. That reſponſe ought to reſume the ſubject in the interval of a fourth or fifth above or below the key, and to purſue it as exactly as the laws of harmony will admit; proceeding from the dominant to the tonic when the ſubject is introduced from the tonic to the dominant, and moving in a contrary direction when the ſubject is introduced from the dominant to the tonic. One part may likewiſe reſume the ſame ſubject in the octave or uniſon of the preceding; but in that caſe, it is a repetition rather than a real reſponſe.

4. As the octave is divided into two unequal parts, of which the one contains four gradations aſcending from the tonic to the dominant, and the other only three in continuing the aſcent from the dominant to the tonic; this renders it neceſſary to have ſome regard to this change in the expreſſion of the ſubject, and to make ſome alterations in the reſponſe, that we may not quit the chords that are eſſential to the mode. It is a different caſe when the compoſer intends to alter the modulation; for there the exactneſs of the reſponſe itſelf, when taken in a different tone, produces the alteration proper for this change.

5. It is neceſſary that the fugue ſhould be planned in ſuch a manner, that the reſponſe may commence before the cloſe of the firſt air, ſo that both the one and the other may be in part heard at the ſame time; that, by this anticipation, the ſubject may be as it were connected with itſelf, and that the art of the compoſer may diſcover itſelf in this concourſe. It is abſolute mockery, inſtead of a fugue, to impoſe upon the hearers the ſame air, merely tranſpoſed from one key to another, without any other reſtraint than an accompaniment afterwards formed at pleaſure. This deſerves at beſt no better name than what the French call *imitation*. See IMITATION.

Beſides theſe rules, which are fundamental, there are others which, though preſcribed by taſte alone, are not leſs eſſential. Fugues, in general, render muſic more noiſy than agreeable; it is for this reaſon that they are more agreeable in the chorus than any where elſe. Now, as their chief merit conſiſts in fixing the ear on the principal air or ſubject, which for this reaſon is made to paſs inceſſantly from part to part, and from mode to mode, the compoſer ought to exert his care in preſerving that air always diſtinct; or to prevent it from being abſorbed in, or confounded with, the other parts. To produce this effect, there are two different ways: one in the movement, which muſt be inceſſantly contraſted with itſelf; ſo, that, if the procedure of the fugue be accelerated, the other parts move gravely and with protracted notes; or, on the contrary, if the motion of the fugue be ſlow and ſolemn, the accompaniments muſt have more and quicker buſineſs. The other method is to extend the harmony, by removing the parts at a greater diſtance one from the other; leſt the others, too nearly approximated to that which contains the ſubject, ſhould be confounded with it, and prevent it from being diſtinguiſhed with ſufficient clearneſs; ſo that what would be an imperfection any where elſe, becomes here a beauty.

The unity of melody ſhould be preſerved: this is the great and general rule, which muſt frequently be practiſed by different means. The chords muſt be choſen, and the intervals, ſo that one particular ſound may produce the chief effect: this can only reſult from the unity of the melody. It will ſometimes be neceſſary to employ voices and inſtruments of different kinds, that the part which ought to prevail may be moſt eaſily diſtinguiſhed: this again ſhews the neceſſity of preſerving the unity of the melody. Another object of attention no leſs neceſſary, is, in the different connections of modulation which are introduced by the procedure and progreſs of the fugue, to cauſe all theſe modulations to correſpond at the ſame time in all the parts, to connect the whole in its progreſs by an exact conformity of modes; leſt, if one part be in one mode, and another in another, the general harmony ſhould be in none at all, and for that reaſon ſhould no longer be able to produce ſimple effects upon the ear, nor ſimple ideas in the mind: which is another reaſon for preſerving unity of melody. In a word, in every fugue the confuſion of melodies and modulations is at once what a compoſer has moſt to fear, and will find the greateſt difficulty in avoiding; and as this kind of muſic never produces a pleaſure above mediocrity, one may ſay that a fine fugue is, though the maſterpiece of an excellent harmoniſt, ungrateful to his toil.

There are ſtill ſeveral other kinds of fugues; ſuch as the perpetual fugue*, the double fugue, the inverted fugue.

* See *Canon*.

The inverted fugue is a manner of compoſition, in which the flying part proceeds in a contrary direction to the other fugue, which had been formerly fixed in the ſame piece of muſic. Thus, when the firſt fugitive part is heard in aſcending from the tonic to the dominant, or from the dominant to the tonic, the counter fugue ought to be heard in deſcending from the dominant to the tonic, or from the tonic to the dominant, and *vice verſa*. Its other rules are exactly like thoſe of the common fugue.

FULCRUM, in mechanics, the prop or ſupport by which a lever is ſuſtained.

FULDE, a conſiderable town of Germany, in the circle of the upper Rhine, and in the Buchow, with a celebrated abbey; whoſe abbot is primate of the abbeys of the empire, perpetual chancellor of the emperor, and ſovereign of a ſmall territory lying between Heſſe, Franconia, and Thuringia. It is ſeated on the river Fulde, 55 miles ſouth of Caſſel, and 58 north-eaſt of Francfort. E. Long. 9. 53. N. Lat. 50. 40.

FULICA, the COOT, in ornithology, a genus of birds, of the order of grallæ. It has a convex bill, with the upper mandible fornicated over the lower at the edge; the lower mandible is gibbous behind the tip. The forehead is bald; and the feet have four toes, a little lobated. There are four ſpecies.

1. The *atra*, or COMMON COOT, hath a bald forehead, a black body, and lobated toes. They frequent lakes and ſtill rivers; making their neſt among the ruſhes, with graſs, reeds, &c. floating on the water, ſo as to riſe and fall with it. They lay five or ſix large eggs, of a dirty whitiſh hue, ſprinkled over with minute deep ruſt-coloured ſpots; and it is ſaid, that ſometimes they will lay 14 or more eggs. The young when juſt hatched are very deformed, and the head mixed with a red coarſe down. In winter they often repair to the ſea, and the channel near Southampton is ſometimes obſerved almoſt covered with them. They are often brought to that market, where they are expoſed to ſale without their feathers, and ſcalded like pigs.

2. The *chloropus*, or COMMON GALLINULE, hath a bald forehead, and toes without webs. It gets its food on graſſy banks, and borders near freſh waters, and in the very waters if they be weedy. It builds upon low trees and ſhrubs by the water-ſide; breeding twice or thrice in a ſummer; and, when the young are grown up, drives them away to ſhift for themſelves. They lay ſeven eggs of a dirty white, thinly ſpotted with ruſt-colour. This bird ſtrikes with its bill like a hen, and in the ſpring has a ſhrill call. In flying, it hangs down its legs; in running, it often flirts up its tail, and ſhews the white feathers. We may obſerve, that the bottoms of its toes are ſo very flat and broad (to enable it to ſwim), that it ſeems to be the bird which connects the cloven-footed aquatics with the next tribe, *viz.* the fin-toed.

3. The FULICA with a bald forehead, a violet-coloured body, and toes without webs, is the purple water-hen of Edwards; and it inhabits Aſia and America.

4. The FULICA with a carunculated head, a variegated body, ſpinous ſhoulders, and toes without webs; but the nail on the hinder toe is exceeding long. It is the ſpur-winged water-hen of Edwards, and is an inhabitant of South America. The nail on the hind toe is ſtraight, and longer than a man's finger. The pollex reſts upon one joint, and the wings are green.

FULIGINOUS, whatever proceeds from a thick, ſooty ſmoke; ſuch as litharge and lamp-black.

FULIGNO, a city of Italy, in the pope's territories, 10 miles north of Spoletto.

FULIGO, in natural hiſtory, a ſpecies of pumice-ſtone. See PUMICE.

FULK (William), a learned and eminent divine of the church of England, in the 16th century. He was patronized by the earl of Leiceſter, who, in 1571, preſented him to the living of Warley in Eſſex, and ſoon after to that of Diddington in Suffolk. He attended Leiceſter, when he went ambaſſador to France; and on his return was made maſter of Pembroke-hall, and Margaret profeſſor of divinity at Cambridge. His works are very numerous, levelled chiefly at the Papiſts; the moſt conſiderable of them is his Comment on the Rhemiſh Teſtament. He died in 1589.

FULLER (Nicholas), prebendary of Saliſbury, and a learned Engliſh critic; who publiſhed, in 1617, *Miſcellanea Theologica*, in four books; and afterward two more of *Miſcellanea Sacra*. He died in 1623; and there are ſome MSS of his remaining in the Bodleian library, that ſhew his great ſkill in Hebrew and philology.

FULLER (Dr Thomas), a learned Engliſh divine, was born at Allvinckle, near Oundle, in Northamptonſhire, about the year 1608, and ſtudied at Cambridge. He was choſen miniſter of St Bennet's there; and at about 23 years of age, his merit procured him a fellowſhip in Sidney college, and a prebend in Saliſbury cathedral. He was ſoon after preſented to the rectory of Broad Windſor, in Dorſetſhire; and afterwards was made lecturer of the Savoy in London: but upon the preſſing of the covenant, he retired to Oxford; and ſoon after accompanied Sir Ralph Hopton as his chaplain in the army, which he attended in their marches from place to place. After the death of king Charles I. he obtained the living of Waltham-abbey, and was appointed lecturer of St Clement's; and ſhortly after removed to the lecture of St Bride's, Fleet-ſtreet. Upon the reſtoration, he recovered his prebend in the cathedral of Saliſbury, was appointed chaplain extraordinary to his majeſty, and created doctor of divinity. It is ſaid his memory was ſo amazingly tenacious and comprehenſive, that he could make uſe of a ſermon *verbatim*, if he once heard it. He once undertook, in paſſing to and from Temple-bar to the Poultry, to tell at his return every ſign as it ſtood in order on both ſides of the way, repeating them either backwards or forwards; and this taſk he actually performed. He wrote, 1. A hiſtory of the holy war. 2. The church-hiſtory of Britain, in folio. 3. Andronicus, or the unfortunate politician, in 8vo. 4. A Piſgah ſight of Paleſtine. 5. A hiſtory of Engliſh worthies; and other works. He died in Auguſt 1661; and was interred in the chancel of Cranford church, in Middleſex, whither his body was attended by at leaſt 200 of his brethren of the miniſtry.

FULLER, a workman employed in the woollen manufactories, to mill or ſcour cloths, ſerges, and other ſtuffs, in order to render them more thick, compact, and durable. See CLOTH.

FULLER's *Earth*, in natural hiſtory, a ſoft, greyiſh, brown, denſe, and heavy marle: when dry, it is of a greyiſh aſh-coloured brown, in all degrees from very pale to almoſt black, and it has generally ſomething of a greeniſh caſt: it is very hard and firm, of a compact texture, of a rough and ſomewhat duſty ſurface that adheres ſlightly to the tongue: it is very ſoft to the touch, not ſtaining the hands, nor breaking eaſily between the fingers: it has a little harſhneſs between the teeth, and melts freely in the mouth: thrown into water, it makes no ebullition or hiſſing; but ſwells gradually in bulk, and falls into a fine ſoft powder. It makes no efferveſcence with aqua fortis.

The greateſt quantity, and the fineſt earth of this kind in the world, is dug in the pits at Wavedon, near Woburn in Bedfordſhire. The ſtrata in theſe pits lie thus: From the ſurface to the depth of ſix feet, there are ſeveral layers or beds of ſand, all reddiſh, but ſome lighter-coloured than others. Under theſe there is a thin ſtratum of a ſand-ſtone, which they break through, and then there is the fuller's earth. The upper ſtratum of this is about a foot thick: the workmen call it *cledge*, and throw it aſide as uſeleſs; being commonly fouled with the ſand which originally covered it, and which inſinuates itſelf a good way into it. After this, they come to the fine fuller's earth for ſale, which lies to the depth of eight feet more. The matter of this is divided into ſeveral layers, there being commonly about a foot and an half between one horizontal fiſſure and another. Of theſe ſeveral layers, the upper half, where the earth breaks itſelf, is tinged red; which ſeems to be owing to the running of the water upon it from among the ſands above; ſome of which are probably of a ferruginous nature, or have ferruginous matter among them. This reddiſh fuller's earth the workmen call *crop*; and between the cledge and this there is a thin ſtratum of matter, of leſs than an inch, which in taſte, colour, and external appearance, reſembles the terra Japonica of the ſhops. The lower half of the ſtrata of fuller's earth they call *wall-earth*. This is untinged with the red colour of the other, and ſeems the moſt proper for fulling. Under the fuller's earth there is a ſtratum of white and coarſe ſtone about two feet thick. They ſeldom dig thro' this; but if they do, they find more ſtrata of ſand.

This earth is of great uſe in ſcouring cloths, ſtuffs, &c. imbibing all the greaſe and oil uſed in preparing, dreſſing, &c. of the wool; for which reaſon it is made a contraband commodity, and is not to be exported under the penalty of 1 s. for every pound weight. See FULLING.

FULLER's-*Weed*, in botany. See DIPSACUS.

FULLERY, a place where cloths, &c. are fulled. See the next article.

FULLING, the art or act of cleanſing, ſcouring, and preſſing cloths, ſtuffs, and ſtockings, to render them ſtronger, cloſer, and firmer: called alſo *milling*. Pliny, (*lib.* vii. *cap.* 56.) aſſures, that one Nicias, the ſon of Hermias, was the firſt inventor of the art of fulling: and it appears by an inſcription, quoted by Sir G. Wheeler, in his travels thro' Greece, that this ſame Nicias was a governor in Geece in the time of the Romans.

The fulling of cloths and other ſtuffs is performed by a kind of water-mill, thence called a *fulling* or *ſcouring mill*.

Theſe mills, excepting in what relates to the millſtones and hopper, are much the ſame with corn-mills. And there are even ſome which ſerve indifferently for either uſe; corn being ground, and cloths fulled, by the motion of the ſame wheel. Whence, in ſome places, particulary in France, the fullers are called *millers*; as grinding corn, and milling ſtuffs, at the ſame time.

The principal parts of the fulling-mill are, The wheel, with its trundle; which gives motion to the tree, or ſpindle, whoſe teeth communicate it to the peſtles, or ſtampers, which are hereby raiſed and made to fall alternately according as its teeth catch on or quit a kind of latch in the middle of each peſtle. The peſtles and troughs are of wood; each trough having at leaſt two, ſometimes three peſtles, at the diſcretion of the maſter, or according to the force of the ſtream of water. In theſe troughs are laid the cloths, ſtuffs, &c. intended to be fulled: then, letting the current of water fall on the wheel, the peſtles are ſucceſſively let fall thereon, and by their weight and velocity ſtamp and preſs the ſtuffs very ſtrongly, which by this means become thickened and condenſed. In the courſe of the operation, they ſometimes make uſe of urine, ſometimes of fuller's earth, and ſometimes of ſoap. To prepare the ſtuffs to receive the firſt impreſſions of the peſtle, they are uſually laid in urine; then in fuller's earth, and water; and laſtly in ſoap, diſſolved in hot water. Soap alone would do very well; but this is expenſive: though fuller's earth, in the way of our dreſſing, is ſcarce inferior thereto; but then it muſt be well cleared of all ſtones and grittineſſes, which are apt to make holes in the ſtuff. As to urine, it is certainly prejudicial, and ought to be entirely diſcarded; not ſo much on account of its ill ſmell, as of its ſharpneſs and ſaltneſs, which qualities are apt to render the ſtuffs dry and harſh.

The true method of fulling with ſoap is delivered by Monſ. Colinet, in an authentic memoir on that ſubject, ſupported by experiments made by order of the marquis de Lonvois, then ſuperintendant of the arts and manufactories of France; the ſubſtance of which we ſhall here ſubjoin.

Method of FULLING *cloths and woollen ſtuffs with Soap.*—A coloured cloth, of about 45 ells, is to be laid in the uſual manner, in the trough of a fulling-mill; without firſt ſoaking it in water, as is commonly practiſed in many places. To full this trough of cloth, 15 pounds of ſoap are required; one half of which is to be melted in two pails of river or ſpring water, made as hot as the hand can well bear it. This ſolution is to be poured by little and little upon the cloth, in proportion as it is laid in the trough: and thus it is to be fulled for at leaſt two hours; after which, it is to be taken out and ſtretched. This done, the cloth is immediately returned into the ſame trough, without any new ſoap; and there fulled two hours more. Then taking it out, they wring it well, to expreſs all the greaſe and filth. After the ſecond fulling, the remainder of the ſoap is diſſolved as in the former, and caſt four different times on the cloth; remembering to take out the cloth every two hours, to ſtretch it, and undo the plaits and wrinkles it has acquired in the trough. When they perceive it ſufficiently fulled, and brought to the quality and thickneſs required, they ſcour it for good in hot water, keeping it in the trough till it be quite clean. As to white cloths; in regard theſe full more eaſily and in leſs time than coloured ones, a third part of the ſoap may be ſpared.

FULLING *of Stockings, Caps, &c.* ſhould be performed ſomewhat differently; viz. either with the feet or the hands; or a kind of rack, or wooden machine, either armed with teeth of the ſame matter, or elſe horſes or bullocks teeth. The ingredients made uſe of herein, are urine, green ſoap, white ſoap, and fuller's earth. But the urine alſo is reckoned prejudicial here. Woven ſtockings, &c. ſhould be fulled with ſoap alone: for thoſe that are knit, earth may be uſed with the ſoap. Indeed, it is frequent to full theſe kinds of works with the mill, after the uſual manner of cloth, &c. But that is too coarſe and violent a manner; and apt to damage the work, unleſs it be very ſtrong.

FULMAR, in ornithology. See PROCELLARIA.

FULMINATING, ſomething that thunders, or reſembles thunder.

FULMINATING *Gold*. See CHEMISTRY, n° 256.

FULMINATING *Powder*. See CHEMISTRY, n° 475.

FULMINATION, in chemiſtry, the ſame with detonation. See NITRE.

FULMINATION, in the Romiſh canon law, a ſentence of a biſhop, official, or other eccleſiaſtic appointed by the pope, by which it is decreed that ſome bull ſent from the pope ſhall be executed.

FUMARIA, FUMITORY; a genus of the hexandria order, belonging to the diadelphia claſs of plants. There are a number of different ſpecies; all of them low, ſhrubby, and deciduous and evergreen plants, growing from two to ſix or ſeven feet high, adorned with ſmall ſimple leaves, and papilionaceous flowers of different colours. The moſt remarkable is the officinalis, or common fumitory; which grows naturally in ſhady cultivated grounds, and produces ſpikes of purpliſh flowers in May and June. It is very juicy, of a bitter taſte, without any remarkable ſmell.—The medical effects of this herb are, to ſtrengthen the tone of the bowels, gently looſen the belly, and promote the urinary and other natural ſecretions. It is principally recommended in melancholic, ſcorbutic, and cutaneous diſorders, for opening obſtructions of the viſcera, attenuating and promoting the evacuation of viſcid juices. Frederic Hoffman had a very great opinion of it as a purifier of the blood; and aſſures us, that in this intention ſcarce any plant exceeds it.—Cows and ſheep eat the plant; goats are not fond of it; horſes and ſwine refuſe it.

FUMIGATION, in chemiſtry, a kind of calcination, when metals, or other hard bodies, are corroded, or ſoftened, by receiving certain fumes for that purpoſe.

FUMIGATION, in medicine. By the ſubtile fumes that are inſpired as well as inhaled into our bodies, much benefit or prejudice is produced, according to the nature of the matter, and the conſtitution into which it is received; as is evident from the palſies produced among workers in lead-mines, &c. and the benefits received in many caſes when the air is impregnated with ſalutary materials. Catarrhs and catarrhous coughs are relieved by fumes received with the breath; and, by the ſame method, expectoration is aſſiſted in humoural aſthmas; and even ulcers in the lungs are ſaid to have been healed by this method. The advantage of mercurial fumigations in the cure of venereal ulcers is known to every practitioner.

FUMITORY, in botany. See FUMARIA.

FUNAMBULUS, among the Romans, was what we call a *rope-dancer*, and the Greeks *ſchœnobates*. See *Rope*-DANCER.

There was a funambulus, it ſeems, who performed at the time when the Hecyra of Terence was acted; and the poet complains, that the ſpectacle prevented the people from attending to his comedy. *Ita populus ſtudio ſtupidus in* funambulo, *animum occuparat*.

At Rome, the funambuli firſt appeared under the conſulate of Sulpicius Pæticus and Licinius Stolo, who were the firſt introducers of the ſcenic repreſentations. It is added, that they were firſt exhibited in the iſland of the Tyber, and that the cenſors Meſſala and Caſſius afterwards promoted them to the theatre.

FUNCHAL, an epiſcopal town of Madeira, in an iſland of the Atlantic Ocean, over-againſt the coaſt of Morocco. It is large, ſtrong, handſome, and populous, with fine churches. The principal trade conſiſts in ſweetmeats and wines. It belongs to the Portugueſe; and is ſeated in a fertile valley, at the foot of a mountain from whence ſeveral ſtreams proceed. W. Long. 14. 30. N. Lat. 31. 30.

FUNCTION, the act of fulfilling the duties of any employment.

FUNCTION, being alſo applied to the actions of the body, is by phyſicians divided into vital, animal, and natural. The *vital* functions are thoſe neceſſary to life, and without which the individual cannot ſubſiſt; as the motion of the heart, lungs, &c. The *natural* functions are ſuch as it cannot ſubſiſt any conſiderable time without; as the digeſtion of the aliment, and its converſion into blood. Under *animal* functions are included the ſenſes of touching, taſting, &c. memory, judgment, and voluntary motion; without any or all of which an animal may live, but not very comfortably.

The animal-functions perform the motion of the body by the action of the muſcles; and this action conſiſts chiefly in the ſhortening the fleſhy fibres, which is called *contraction*, the principal agents of which are the arteries and nerves diſtributed in the fleſhy fibres.

All parts of the body have their own functions, or actions, peculiar to themſelves. Life conſiſts in the *exerciſe* of theſe functions, and health in the *free* and *ready* exerciſe of them.

FUND, in general, ſignifies any ſum of money appropriated for a particular purpoſe. Thus, that part of the national revenue which is ſet aſide for the pay-

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Plate CXIV.

Fig 1. **FIRE** *Ship.*

Fig. 2.

Fig. 3.

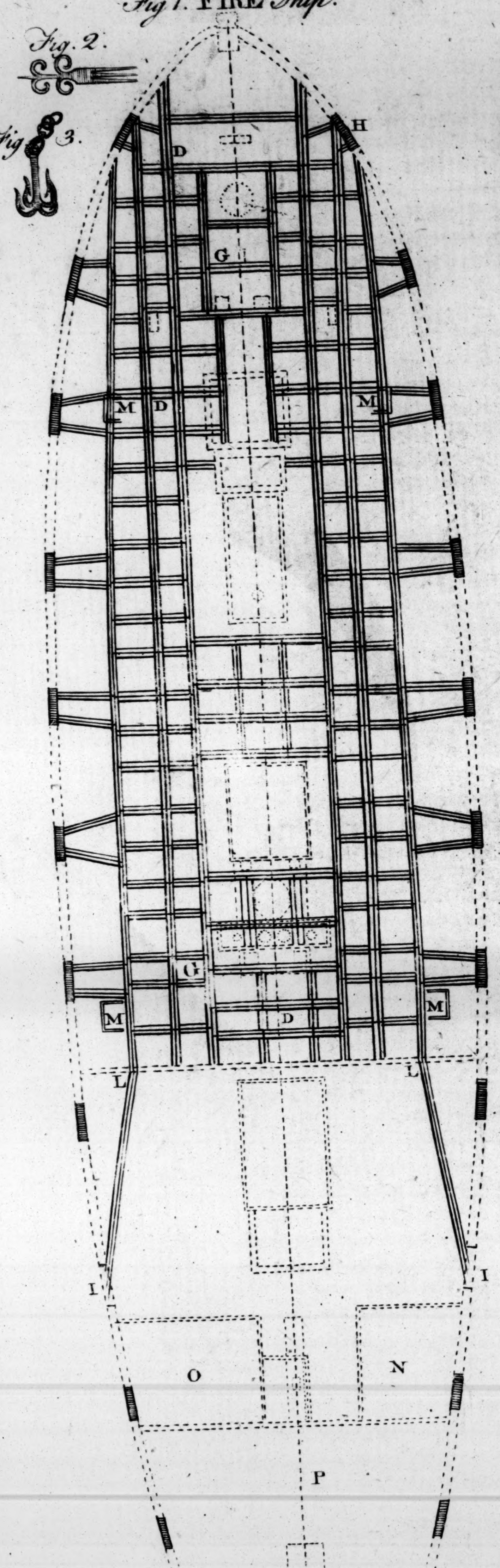
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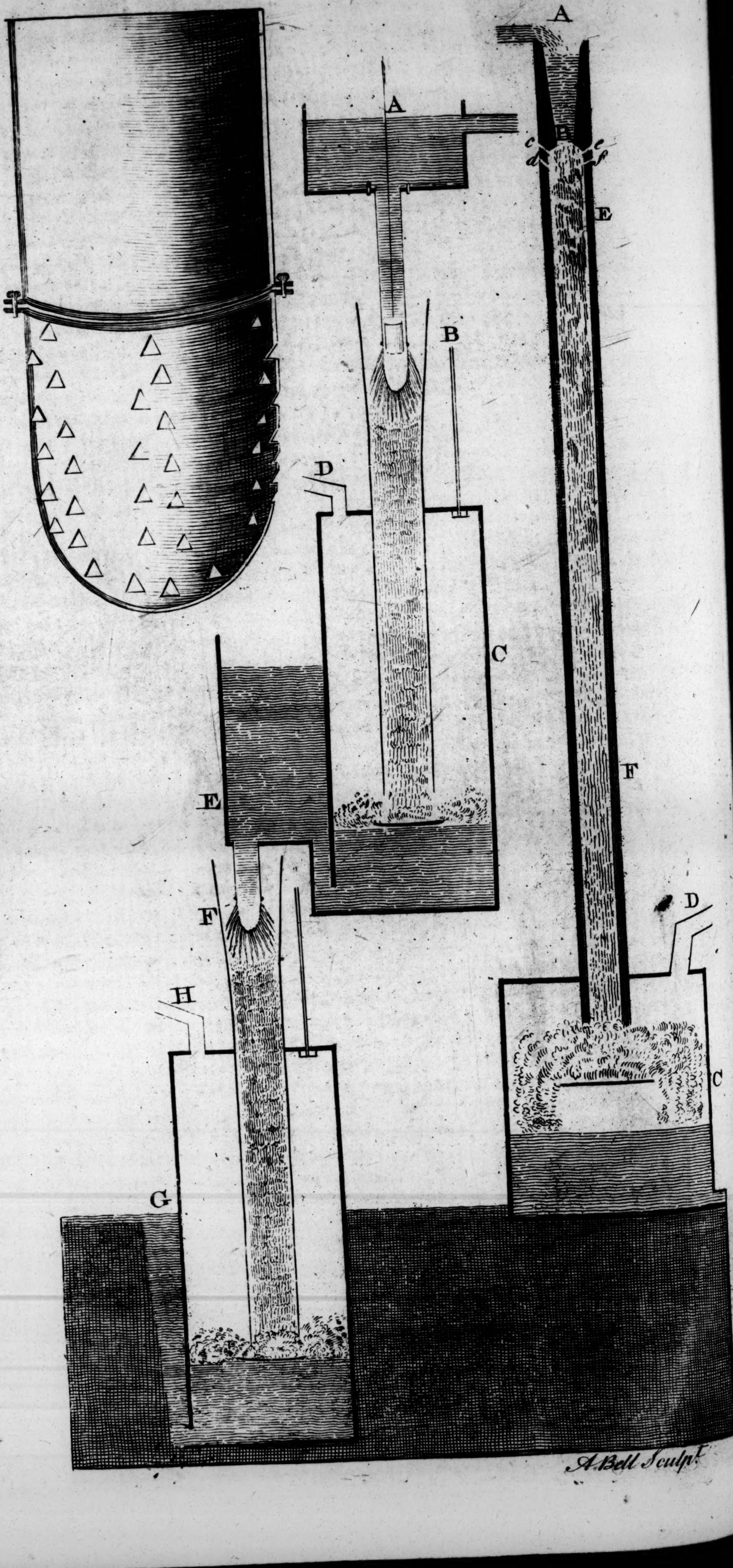
Fig. 4.
Machines for Blowing Air into
FURNACES.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A. Bell Sculpt.

ment of the national debt, is called the *ſinking fund.* But, when we ſpeak of *the funds*, we generally mean the large ſums which have been lent to government, and conſtitute the national debt; and for which the lenders, or their aſſignees, receive intereſt from revenues allotted for that purpoſe. The term *ſtock* is uſed in the ſame-ſenſe, and is alſo applied to the ſums which form the capital of the bank of England, the Eaſt India and South-Sea companies; the proprietors of which are entitled to a ſhare of the profits of the reſpective companies.

The practice of funding was introduced by the Venetians and Genoeſe in the 16th century, and has been adopted ſince by moſt of the nations in Europe. Princes had often borrowed money, in former times, to ſupply their exigencies, and ſometimes mortgaged their territories in ſecurity: but theſe loans were generally extorted, and their payment was always precarious; for it dependedon the good faith and ſucceſs of the borrower, and never became a regular burden on poſterity. The origin of funds is derived from the peculiar manners and circumſtances of modern Europe. Since the invention of gun-powder, and the progreſs of commerce, the military occupation has become a diſtinct employment in the hands of mercenaries; the apparatus of war is attended with more expence; and the deciſion of national quarrels has often been determined by command of money, rather than by national bravery. Ambitious princes have therefore borrowed money, in order to carry on their projects with more vigour. Weaker ſtates have been compelled, in ſelf-defence, to apply to the ſame reſource; the wealth introduced by commerce has afforded the means; the regularity of adminiſtration, eſtabliſhed in conſequence of the progreſs of civility, has increaſed the confidence of individuals in the public ſecurity; the complicated ſyſtem of modern policy has extended the ſcenes of war, and prolonged their duration; and the colonies eſtabliſhed by the mercantile nations have rendered them vulnerable in more points, and increaſed the expence of defending them.

When a greater ſum has been required for the annual expence, than could eaſily be ſupplied by annual taxes, the government have propoſed terms, to their own ſubjects, or foreigners, for obtaining an advance of money, by mortgaging the revenue of future years for their indemnification. This mortgage may either be for a limited period, or perpetual. If the ſum allotted annually for the benefit of thoſe who advance the money, be conſiderably greater than the intereſts of the ſums advanced, they may agree to accept of ſuch allowance, for a limited time, as a full equivalent. Thus, they may either agree for the caſual produce of the revenue aſſigned; or a fixed annuity for a greater or leſs number of years; or a life-annuity to themſelves or nominees; or an annuity for two or more lives; or an annuity, with the benefit of ſurvivorſhip, called a *tontine*, in which ſcheme, the whole ſum to which the original annuitants were entitled continues to be diſtributed among the ſurvivors.

When the ſum alltoted to the creditors of the public is only equivalent to the intereſt of the money advanced, the grant muſt be perpetual, unleſs the debt be redeemed by payment of the principal.

The eſtabliſhment of the funds was introduced in Britain at the revolution; and has ſince been gradually enlarged, and carried to an amazing extent. The various methods above mentioned have been uſed in their turns; but perpetual annuities have been granted for the greateſt part; and, even when the money was originally advanced on other conditions, the lenders have been ſometimes induced, by ſubſequent offers, to accept of perpetual annuities, inſtead of the former terms. The debt for which perpetual annuities are granted, is called the *redeemable debt*, and the other is called the *irredeemable debt*. Although the debts thus contracted by government are ſeldom paid for a long term of years; yet, any creditor of the public may obtain money for what is due him when he pleaſes, by transferring his property in the funds to another; and regular methods are appointed for tranſacting theſe transfers, in an eaſy manner. By means of this, the ſtocks become a kind of circulating capital; and have the ſame effect, in ſome reſpects, as the circulating money in the nation. When a ſtockholder transfers his ſhare, he may ſometimes be able to obtain a greater price than the original value, and at other times be obliged to accept of a leſs one. The value of the funds depends on the proportion between the intereſt they bear, and the benefit which may be obtained by applying the money to other purpoſes. It is influenced by the plenty or ſcarcity of money, and by the quantity of the public debt; and it is impaired by any event which threatens the ſafety, or weakens the credit, of the government.

The buſineſs of ſtock-jobbing is founded on the variation of the prices of ſtock. Perſons poſſeſſed of real property may buy or ſell ſtock, according to their notion that the value is likely to riſe or fall, in expectation of making profit by the difference of price. And a practice has taken place among perſons who often poſſeſs no property in the funds, to contract for the ſale of ſtock againſt a future day, at a price now agreed on. For inſtance: A agrees to ſell B 1000 *l.* of bank-ſtock, to be transferred, in 20 days, for 1200 *l.* A has, in fact, no ſuch ſtock; but, if the price of bank-ſtock, on the day appointed for the transfer, ſhould be only 118 *per cent.* A may purchaſe as much as will enable him to fulfil his bargain for 1180 *l.*, and thus gains 20 *l.* by the tranſaction; on the contrary, if the price of bank-ſtock be 125 *per cent.* he will loſe L. 50. The buſineſs is generally ſettled without any actual purchaſe or transfer of ſtock, by A paying to B, or receiving from him, the difference between the current price of the ſtock on the day appointed, and the price bargained for.

This practice, which is really nothing elſe than a wager concerning the price of ſtock, is contrary to law; yet it is carried on to a great extent. In the language of Exchange-alley, where matters of this kind are tranſacted, the buyer is called a *bull*, and the ſeller a *bear*. As neither party can be compelled by law to implement theſe bargains, their ſenſe of honour, and the diſgrace and loſs of future credit, which attend a breach of contract, are the principles by which the buſineſs is ſupported. When a perſon declines to pay his loſs, he is called a *lame duck*, and dare never afterwards appear in the Alley. This opprobrious treatment, however, is not beſtowed on thoſe whoſe failure is owing to want of ability, providing they make the ſame ſurrender of their property voluntarily, which the law would have exacted if the debt had been entitled to its ſanction.

The intereſt or dividend on the ſtock is paid half-yearly; and the purchaſer has the benefit of the intereſt due on the ſtock he buys, from the laſt term to the time of purchaſe. Therefore the prices of the ſtocks riſe gradually, *cæteris paribus*, from term to term, and fall at the term when the intereſt is paid. In comparing the prices of the different ſtocks, it is neceſſary to advert to the term when the laſt intereſt was paid; and, allowance being made for this circumſtance, the prices of all the government ſtocks, which bear intereſt at the ſame rate, muſt be nearly the ſame, as they all depend on the ſame ſecurity.

When a loan is propoſed, ſuch terms muſt be offered to the lenders, as may render the tranſaction beneficial; and this is now regulated by the prices of the old ſtocks. If the ſtocks, which bear intereſt at 4 per cent. ſell at par, or rather above, the government may expect to borrow money at that rate; but, if theſe ſtocks are under par, the government muſt either grant a higher intereſt, or ſome other advantage to the lenders, in compenſation for the difference. For this purpoſe, beſides the perpetual annuity, another annuity has ſometimes been granted for life, or for a term of years. Lotteries have frequently been employed to facilitate the loan, by entitling the ſubſcribers to a certain number of tickets, for which no higher price is charged than the exact value diſtributed in prizes, though their market-price is generally L. 2 or L. 3 higher. Sometimes an abatement of a certain proportion of the capital has been granted, and a lender entitled to hold L. 100 ſtock, though in reality he advanced no more, perhaps, than L. 95.

It belongs to the Chancellor of the Exchequer to propoſe the terms of the loan in parliament; and he generally makes a previous agreement with ſome wealthy merchants, who are willing to advance the money on the terms propoſed. The ſubſcribers to the loan depoſit a certain part of the ſum ſubſcribed; and are bound to pay the reſt by inſtalments, or ſtated proportions, on appointed days, under pain of forfeiting what they have depoſited. For this they are entitled, perhaps, not only to hold their ſhare in the capital, but to an annuity for 10 years, and to the right of receiving a certain number of lottery-tickets on advantageous terms. They may ſell their capital to one perſon, their annuity to a ſecond, and their right to the tickets to a third. The value of all theſe intereſts together is called *omnium;* and, in order to obtain a ready ſubſcription, it ought to amount to L. 102, or upwards, on L. 100 of capital. This difference is called the *bonus* to the ſubſcribers.

When a loan is made, a new tax is impoſed to defray the annuities. For ſome time, each tax was particularly appropriated for the payment of annuities then created: but the method was found inconvenient, as ſome of the taxes fell ſhort of the ſum expected, while others exceeded it; and the multiplicity of funds produced confuſion. This gave occaſion to unite the various branches of the revenue into a few funds. The *South-Sea Fund* was eſtabliſhed in the year 1711, for payment of the annuities due to that company. The *Aggregate Fund* was eſtabliſhed in 1715, and the *General Fund* in 1717, for the payment of other annuities. All the other branches of the revenue then ſubſiſting, except the annual land and malt tax, and the branches applied for the ſupport of the civil government, were appropriated to one or other of theſe funds. And, as theſe revenues were conſiderably greater than the charges for which the funds were anſwerable, the overplus was appointed to be collected together, and remain at the diſpoſal of parliament; and is known by the name of the *Sinking Fund*, becauſe intended for the diſcharge of the national debt. At the beginning of the preſent reign, the revenues appropriated to the civil liſt were added to the aggregate fund, and that fund charged with the nett ſum of L. 800,000, ſince increaſed to L. 900,000, in place of the ſame. When money has been borrowed ſince the eſtabliſhment of theſe funds, the ſinking fund is made a collateral ſecurity, in caſe the tax impoſed for the payment of the annuity ſhould prove deficient; and ſometimes the new taxes have been directly paid into that fund, and the annuities charged on the ſame; and the faith of parliament is pledged to corroborate the ſecurity. The ſinking fund has yielded an annual overplus, for many years, of more than two millions Sterling; which, in time of war, is applied to the current ſervices; and, even in time of peace, a conſiderable part is diverted to the ſame purpoſe; as the annual land and malt tax, the only other unappropriated funds, are inſufficient for defraying the charge of a peace-eſtabliſhment.

The terms of the government loans have been very different, according to the circumſtances under which they took place. The intereſt has generally been lower than the current intereſt of the nation, becauſe it is punctually paid; and the government ſecurity is eſteemed preferable to any of a private kind. Sometimes, however, when the exigencies were preſſing, and the national reſources, in ſome meaſure, exhauſted by the continuance of war, a higher intereſt has been granted than was current in private debts. But, as the prices of ſuch ſtocks roſe above par in peaceable times, advantage was taken of that circumſtance to prevail on the holders to conſent to a reduction of the intereſt, by offering payment of the principal, in caſe they refuſed. Thus, the intereſt on the greater part of the national debt, contracted before the late war with France, was reduced to 3 *per cent.* and the ſtocks were united under the names of *reduced* and *conſolidated* annuities. Part of the conſolidated annuities bear intereſt at 4 *per cent.* till the year 1781, when it falls, like the reſt, to 3 *per cent.* In ſubſequent loans, the faith of parliament has ſometimes been engaged, that the debt ſhall not be redeemed, and, of conſequence, the intereſt not reduced, for a number of years condeſcended on.

The riſe of the terms of the public loans, during the continuance of war, will appear from the following abſtract of thoſe which was made during the late war with France and Spain, and the preſent conteſt with America.

Loans for French War.

1755.	At 3 per cent, by lottery	L. 900,000
1756.	At 3½ per cent. -	1,500,000
	At 3 per cent. by lottery	500,000

1757.	At 3 per cent. and an additional life-annuity of 1 per cent.	3,100,000
1758.	At 3½ per cent. - -	4,500,000
	At 3 per cent. by lottery -	500,000
1759.	At 3 per cent. and a premium of 15 per cent. additional capita'.	7,590,000
1760.	At 4 per cent. irredeemable for 20 years, and 3 per cent. thereafter, with a premium of 3 per cent. additional capital	8,240,000
1761.	At 3 per cent. irredeemable for 20 years, beſides ann. of L. 1 : 2 : 6 per L. 100 for 99 years	11,400,000
	At 3 per cent. by lottery	600,000
1762.	At 4 per cent. irredeemable for 20 years, and an annuity of 1 per cent. for 98 years -	12,000,000
	The remaining debt, not provided for at the peace, was partly paid off in the ſubſequent years, and the reſt funded at 3 per cent.	

Loans for American war.

1776.	At 3 per cent. with premium of 8 per cent. additional capital, and benefit of lottery -	L. 2,160,000
1777.	At 4 per cent. irredeemable for 10 years, with an annuity of 1 per cent. for 10 years, and benefit of lottery -	5,500,000
1778.	At 3 per cent. perpetual annuity, with an additional annuity of 2 per cent. for 30 years, and benefit of lottery -	6,000,000
1777.	At 3 per cent. perpetual annuity, and L. 3 : 15 s. per cent. annuity for 29 years, and benefit of lottery -	7,000,000

The capital advanced to the public, in the form of transferable ſtocks, and bearing intereſt from taxes appropriated for that purpoſe, is called the *funded debt*. Beſides, there is generally a conſiderable ſum due by government, which is not diſpoſed of in that manner, and therefore is diſtinguiſhed by the appellation of the *unfunded debt*. This may ariſe from any ſort of national expence, for which no proviſion has been made, or for which the proviſion has proved unſufficient. The forms of the unfunded debts are various, according to the circumſtances by which it is occaſioned. But there are two regular branches of this debt, which always ſubſiſt, to a greater or leſſer extent.

1ſt, *Exchequer Bills*. Theſe are iſſued from the exchequer, generally by appointment of parliament, and ſometimes without ſuch appointment, when exigencies require. They bear intereſt from the time when iſſued, and are taken in by the bank of England, which promotes their circulation.

2d, *Navy-Bills*. The ſums annually granted for the navy have always fallen ſhort of what that ſervice required. To ſupply that deficiency, the admiralty iſſues bills in payment of victuals, ſtores, and the like, which bear intereſt ſix months after the time iſſued. The debt of the navy thus contracted is diſcharged, from time to time, by parliament.

In time of war, the public expences, ſince the revolution, have always been much greater than the annual revenue; and large ſums have conſequently been borrowed. In time of peace, the revenue exceeds the expence, and part of the public debts have frequently been paid off. But, though there have been more years of peace than of war ſince the funds were eſtabliſhed, the debts contracted during each war have much exceeded the payments during the ſubſequent peace. This will appear by the following abſtract of the progreſs of the national debt.

Debt at peace of Ryſwich, 1697 L.	21,515,472
Debt at the beginning of war 1701	16,394,701
Diſcharged during peace 1697 to 1701	5,121,071
Debt at peace of Utrecht 1714, including value of annuities afterwards ſubſcribed to South-Sea ſtock -	55,282,978
Contracted in war 1701 to 1714	38,888,277
Debt at beginning of war 1740, including L. 1,000,000, charged on civil liſt - - -	47,954,623
Diſcharged during peace 1714 to 1739	7,328,355
Debt at Peace of Aix-la-Chapelle, 1748	79,193,313
Contracted during war 1740 to 1748	31,238,690
Debt at beginning of war 1756	73,289,673
Paid off during peace 1748 to 1756	5,903,640
Debt funded at the peace 1763, including L. 9,839,597 then owing, which was funded in the ſubſequent years	133,957,270
Beſides this, there was about L.6,000,000 of debt paid off, without ever being funded.	
Funded debt, 1775 -	125,00,000
Paid off during peace 1763 to 1775, beſides unfunded debt above mentioned	8,959,270
Funded debt contracted during the American war 1776 to 1779, incluſive	20,600,000

FUNDAMENT, in anatomy, the loweſt part of the inteſtinum rectum, called by anatomiſts the *anus*. See ANATOMY, nº 354.

FUNDAMENTAL, in general, ſomething that ſerves as a baſe or foundation for another.

FUNDAMENTAL, in muſic. A *fundamental ſound* is that which forms the loweſt note of the CHORD, and from whence are deduced the harmonical relations of the reſt; or, which ſerves for a key to the tone *. The *fundamental baſs* is that which ſerves for a foundation to the harmony. A *fundamental chord* is that whoſe baſs is fundamental, and in which the ſounds are ranged in the ſame order as when they are generated, according to the experiment ſo often repeated by M. d'Alembert, in his Preliminary Diſcourſe and Elements of Muſic †. But as this order removes the parts to an extreme diſtance one from the other, they muſt be approximated by combinations or inverſions; but if the baſs remains the ſame, the chord does not for this reaſon ceaſe to bear the name of *fundamental*. Such an example is this chord, *ut mi ſol*, included in the interval of a fifth: whereas, in the order of its generation, *ut ſol mi*, it includes a tenth, and even a ſeventeenth; ſince the fundamental *ut* is not the fifth of *ſol*, but the octave of that fifth.

* See *Tonic*.

† See *Muſic*.

FUNDAMENTAL *Baſs*. This part in muſic is, according to Rouſſeau, and indeed according to all authors who have proceeded upon M. Rameau's experiment, in its primary idea, that baſs which is formed by the fundamental notes of every perfect chord that conſtitutes the harmony of the piece; ſo that under each chord it cauſes to be heard, or underſtood, the fundamental ſound of that particular chord; that is to ſay, the ſound from whence it is derived by the rules of harmony. From whence we may ſee, that the fundamental baſs can have no other contexture than that of a regular and fundamental ſucceſſion, without which the procedure of the upper parts would be illegitimate.

To underſtand this well, it is neceſſary to be known, that, according to the ſyſtem of Rameau, which Rouſſeau has followed in his Dictionary, every chord, tho' compoſed of ſeveral ſounds, can only have one which is its fundamental, *viz.* that which produces this chord, and which is its baſs according to the direct and natural order. Now, the baſs which prevails under all the other parts, does not always expreſs the fundamental ſounds of the chords: for amongſt all the ſounds which form a chord, the compoſer is at liberty to transfer to the baſs that which he thinks preferable; regard being had to the procedure of that baſs, to the beauty of the melody, and above all to the expreſſion, as may afterwards be explained. In this caſe the real fundamental ſound, inſtead of retaining its natural ſtation, which is in the baſs, will either be transferred to ſome of the other parts, or perhaps even entirely ſuppreſſed, and ſuch a chord is called an *inverted* chord.

In reality, ſays Rameau, a chord inverted does not differ from the chord in its direct and natural order from which it was produced: but as theſe ſounds form different combinations, theſe combinations have long been taken for fundamental chords; different names have been given them, (which may be ſeen at the word Accord, in Rouſſeau's Dictionary). Theſe names, by the perſons who beſtowed them, were thought to create and ſanctify their diſtinctions; as if a difference in names could really produce a difference in the ſpecies.

Mr Rameau in his Treatiſe of Harmony has ſhown, and M. D'Alembert in his Elements of Muſic has ſtill more clearly evinced, that many of theſe pretendedly different chords were no more than inverſions of one ſingle chord. Thus the chord of the ſixth is no more than the perfect chord of the third transferred to the baſs; by adding a fifth, we ſhall have the chord of the ſixth and fourth. Here there are three combinations of a chord, which only conſiſts of three ſounds; thoſe which contain four ſounds are ſuſceptible of four combinations, ſince each of theſe ſounds may be transferred to the baſs. But in adding beneath this another baſs which, under all the combinations of one and the ſame chord, always preſents the fundamental ſound; it is evident, that conſonant chords are reduced to the number three, and the number of diſſonant chords to four. Add to this all the chords by ſuppoſition, which may likewiſe be reduced to the ſame fundamentals, and you will find harmony brought to a degree of ſimplicity in which no perſon could ever hope to ſee it whilſt its rules remained in that ſtate of confuſion where M. Rameau found them. It is certainly, as that author obſerves, an aſtoniſhing occurrence, that the practice of this art could be carried ſo far as it really was, without knowing its foundation; and that all the rules were ſo exactly found, without having diſcovered the principle on which they depended.

After having ſhown what is the fundamental baſs beneath the chords, let us now ſpeak of its procedure, and of the manner in which it connects theſe chords among themſelves. Upon this point the precepts of the art may be reduced to the ſix following rules.

1. The fundamental baſs ought never to ſound any other notes than thoſe of the ſeries or tone in which the compoſer finds himſelf, or at leaſt thoſe of the ſeries or tone to which he chooſes to make a tranſition. This of all the rules for the fundamental baſs is the firſt and moſt indiſpenſable.

2. By the ſecond, its procedure ought to be ſo implicitly ſubjected to the laws of modulation, as never to ſuffer the idea of a former mode to be loſt till that of a ſubſequent one can be legitimately aſſumed; that is to ſay, that the fundamental baſs ought never to be devious, or ſuffer us to be one moment at a loſs in what mode we are.

3. By the third, it is ſubjected to the connection of chords and the preparation of diſſonances: a manœuvre which, as we ſhall afterwards ſee, is nothing elſe but a method of producing this connection, and which of conſequence is only neceſſary when the connection cannot ſubſiſt without it. See Connection, Preparation.

4. By the fourth, it is neceſſitated, after every diſſonance, to purſue that career which the reſolution of the diſſonance indiſpenſably preſcribes. See Resolution.

5. By the fifth, which is nothing elſe but a conſequence of the former, the fundamental baſs ought only to move by conſonant intervals; except alone in the operation of a broken cadence, or after a chord of the ſeventh diminiſhed, where it riſes diatonically. Every other motion of the fundamental baſs is illegitimate.

6. By the ſixth, in ſhort, the fundamental baſs or harmony ought not to be ſyncopated; but to diſtinguiſh the bars and the times which they contain, by changes of chords properly marked with cadences; in ſuch a manner, for inſtance, that the diſſonances which ought to be prepared may find their preparation in the imperfect time, but chiefly that all the repoſes may happen in the perfect time. This ſixth rule admits of an infinite number of exceptions; but the compoſer ought however to be attentive to it, if he would form a muſic in which the movements are properly marked, and in which the bars may end gracefully.

Wherever theſe rules are obſerved, the harmony ſhall be regular and without fault: this, however, will not hinder the muſic from being deteſtable. See Composition.

A word of illuſtration on the fifth rule may not be uſeleſs. Whatever turn may be given to a fundamental baſs, if it is properly formed, one of theſe alternatives muſt always be found: either, perfect chords moving by conſonant intervals, without which theſe chords would have no connexion; or, diſſonant chords in operations of cadence: in every other caſe, the diſſonance can neither be properly placed nor properly reſolved.

From thence it follows, that the fundamental baſs cannot move regularly but in one of theſe three manners. *1ſt*, To riſe or deſcend by a third or by a ſixth. *2dly*, By a fourth or a fifth. *3dly*, To riſe diatonically by means of the diſſonance which forms the connection, or by a licence upon a perfect chord. With reſpect to a diatonic deſcent, it is a motion abſolutely prohibited to the fundamental baſs; or, at moſt, merely tolerated in caſes where two perfect chords are in ſucceſſion, divided by a cloſe expreſſed or underſtood. This rule has no other exception: and it is from not diſcerning the foundation of certain tranſitions, that M. Rameau has cauſed the fundamental baſs to deſcend diatonically under chords of the ſeventh; an operation which is impracticable in legitimate harmony. See CADENCE, DISSONANCE.

The fundamental baſs, which they add for no other reaſon than to ſerve as a proof of the harmony, muſt be retrenched in execution, and often in practice it would have a very bad effect; for it is, as M. Rameau very properly obſerves, intended for the judgment and not for the ear. It would at leaſt produce a monotony extremely nauſeous by frequent returns of the ſame chord, which they diſguiſe and vary more agreeably by combining it in different manners upon the continued baſs, without reckoning upon the different inverſions of harmony which furniſh a thouſand means of adding new beauties to the muſic, and new energy to the expreſſion. See CHORD, INVERSION.

But it will be objected, If the fundamental baſs is not uſeful in compoſing good muſic, if it muſt even be retrenched in practice, what good purpoſe, then, can it ſerve? We anſwer, that, in the firſt place, it ſerves for a rule to ſcholars, upon which they may learn to form a regular harmony, and to give to all the parts ſuch a diatonic and elementary procedure as is preſcribed them by that fundamental baſs. It does more, as we have already ſaid: it proves whether a harmony already formed be juſt and regular; for all harmony which cannot be ſubjected to the teſt of a fundamental baſs, muſt according to all rules be bad. Finally, it ſerves for the inveſtigation of a continued baſs under a given air: tho' in reality, he who cannot directly form a continued baſs, will ſcarcely be able to form a fundamental baſs, which is better; and much leſs ſtill will he be able to transform that fundamental baſs into a legitimate continued baſs. Theſe which follow are, however, the principal rules which M. Rameau preſcribes for finding the fundamental baſs of a given air.

1. To aſcertain with preciſion the mode in which the compoſer begins, and thoſe through which he paſſes. There are alſo rules for inveſtigating the modes; but ſo long, ſo vague, ſo incomplete, that, with reſpect to this, the ear may be formed long before the rules are acquired; and the dunce who ſhould try to uſe them, would gain no improvement but the habit of proceeding always note by note, without even knowing where he is.

2. To try in ſucceſſion under each note the principal chords of the mode, beginning by thoſe which are moſt analogous, and paſſing even to the moſt remote, when the compoſer ſees himſelf under a neceſſity of doing ſo.

3. To conſider whether the chord choſen can ſuit the upper part in what precedes and in what follows, by a juſt fundamental ſucceſſion; and when this is impracticable, to return the way he came.

3. Not to change the note of the fundamental baſs till after having exhauſted all the notes which are allowed in ſucceſſion in the upper part, and which can enter into its chord; or till ſome ſyncopated note in the air may be ſuceptible of two or a greater number of notes in the baſs, to prepare the diſſonance which may be afterwards reſolved according to rule.

5. To ſtudy the intertexture of the phraſes; the poſſible ſucceſſion of cadences, whether full or avoided; and above all, the pauſes which for ordinary return at the end of every four, or of every two bars, ſo that they may always fall upon perfect and regular cadences.

6. In ſhort, to obſerve all the rules formerly given for the compoſition of the fundamental baſs.—Theſe are the principle obſervations to be made for finding one under any given air; for there are ſometimes ſeveral different ones which may be inveſtigated. But, whatever may be ſaid to the contrary, if the air has accent and character, there is only one juſt fundamental baſs which can be adapted to it.

After having given a ſummary explication of the manner in which a fundamental baſs ſhould be compoſed, it ſhould remain to ſuggeſt the means of tranſforming it into a continued baſs; and this would be eaſy, if it were only neceſſary to regard the diatonic procedure and the agreeable air of this baſs. But let us not imagine, that the baſs, which is the guide and ſupport of the harmony, the ſoul, and as it were the interpreter, of the air, ſhould be limited to rules ſo ſimple: there are others which depend upon principles more certain and more radical; fruitful, but latent principles, which have been felt by every artiſt of genius, without having been detected by any one. Rouſſeau hopes, that in his letter upon French muſic he inſinuated this principle. For thoſe who underſtand him, he imagines he has ſaid enough concerning it, and can never ſay enough of it for thoſe who do not. See *Rouſſeau's Miſcellanies*, Vol. II. p. 1.

He does not here mention the ingenious ſyſtem by M. Serre of Geneva, nor his double fundamental baſs; becauſe the principles, which, with a ſagacity meritorious of praiſe, he had half detected, have afterwards been unfolded by M. Tartini, in a work of which Rouſſeau has give an account in his article SYSTEM.

FUNDY-BAY, a bay ſeated between New-England and Acadia or New-Scotland, in which there is an excellent fiſhery.

FUNEN, or FIONIA, a conſiderable iſland in Denmark, ſeated on the Baltic ſea, and ſeparated from Jutland by a ſtrait called the *Leſſer Belt*, and from the iſland of Zealand by another called the *Great Belt*. It is fertile in wheat and barley; and abounds in cattle, horſes, game of all ſorts, and fiſh. Odenſee is the capital town.

FUNERAL RITES, ceremonies accompanying the interment or burial of any perſon.

Theſe rites differed among the ancients according to the different genius and religion of each country. The Egyptians, among the reſt of their funeral rites, embalmed their dead.

Among the ancient Greeks it was uſual ſometimes, before the interment, to put a piece of money into the mouth of the deceaſed, which was thought to be Charon's fare for wafting the departed ſoul over the infernal river. This ceremony was not uſed in thoſe countries which were ſuppoſed to be ſituated in the neighbourhood of the infernal regions, and to lead thither by a ready and direct road. The corpſe was likewiſe furniſhed with a cake, compoſed of flour, honey, &c. which was deſigned to appeaſe the fury of Cerberus the door-keeper of hell, and to procure the ghoſt a ſafe and quiet entrance.

During the time the corpſe continued in the houſe, there ſtood before the door a veſſel of water: the deſign of which was, that thoſe concerned about the body might purify themſelves by waſhing; it being the opinion of the Greeks, as well as of the Jews, that pollution was contracted by touching a dead body.

The ceremonies by which they expreſſed their ſorrow for the death of their friends, were various; but it ſeems to have been a conſtant rule to recede as much as poſſible in habit and behaviour from their ordinary cuſtoms. For this reaſon they abſtained from banquets and entertainments; they diveſted themſelves of all ornaments; they tore, cut off, or ſhaved their hair, which they caſt into the funeral pile, to be conſumed with the body of their deceaſed friend. Sometimes they threw themſelves on the ground, and rolled in the duſt, or covered their head with aſhes; they beat their breaſts, and even tore their fleſh with their nails, upon the loſs of a perſon they much lamented. When perſons of rank, ſuch as public magiſtrates or great generals, died, the whole city put on a face of mourning; all public meetings were intermitted; the ſchools, baths, ſhops, temples, and all places of concourſe, were ſhut up.

Interring or laying the dead on the ground, ſeems to have been the moſt ancient practice among the Greeks; though burning came afterwards to be generally uſed among them. It was cuſtomary to throw into the funeral pile, thoſe garments the deceaſed uſually wore, The pile was lighted by one of the deceaſed's neareſt relations or friends, who made prayers and vows to the winds to aſſiſt the flames, that the body might quickly be reduced to aſhes; and during the time the pile was burning, the dead perſon's friends ſtood by it, pouring libations of wine, and calling upon the deceaſed.

When Numa reformed the religion of Rome, he ordered that the pontiffs ſhould have the care of the funeral ceremonies; which, in moſt reſpects, were like thoſe of the Greeks already deſcribed.

The funeral rites among the Hebrews were ſolemn and magnificent. When any perſon was dead, his relations and friends rent their cloths; which cuſtom is but faintly imitated by the modern Jews, who only cut off a bit of their garment, in token of affliction. It was uſual to bend the dead perſon's thumb into the hand, and faſten it in that poſture with a ſtring; becauſe the thumb then having the figure of the name of God, they thought the devil would not dare to approach it. When they came to the burying place, they made a ſpeech to the dead in the following terms: "Bleſſed be God, who has formed thee, fed thee, maintained thee, and taken away thy life. O dead! he knows your numbers, and ſhall one day reſtore your life, &c." Then they ſpoke the elogium, or funeral oration, of the deceaſed; after which they ſaid a prayer, called the *righteouſneſs of judgment*; then turning the face of the deceaſed towards heaven, they called out, "Go in peace."

The ancient Chriſtians teſtified their abhorrence of the Pagan cuſtom of burning the dead; and always depoſited the body entire in the ground: and it was uſual to beſtow the honour of embalming upon the martyrs at leaſt, if not upon others. They prepared the body for burial, by waſhing it with water, and dreſſing it in a funeral attire. The exportation or carrying forth of the body was performed by near relations, or perſons of ſuch dignity as the circumſtances of the deceaſed required. Pſalmody, or ſinging of pſalms, was the great ceremony uſed in all funeral proceſſions among the ancient Chriſtians.

In the Romiſh church, when a perſon is dead, they waſh the body, and put a crucifix in its hand. At its feet ſtands a veſſel full of holy water, and a ſprinkler, that they who come in may ſprinkle both themſelves and the deceaſed. In the mean time ſome prieſt ſtands by the corpſe, and prays for the deceaſed till it is laid in the earth. In the funeral proceſſion, the exorciſt walks firſt, carrying the holy water; next the croſsbearer, afterwards the reſt of the clergy, and laſt of all the officiating prieſt. They all ſing the *miſerere*, and ſome other pſalms; and at the end of each pſalm a *requiem*. We learn from Alet's ritual, that the faces of deceaſed laymen muſt be turned towards the altar, when they are placed in the church; and thoſe of the clergy, towards the people. The corpſe is placed in the church ſurrounded with lighted tapers: after the office for the dead, maſs is ſaid; then the officiating prieſt ſprinkles the corpſe thrice with holy water, and as often throws incenſe on it. The body being laid in the grave, the friends and relations of the deceaſed ſprinkle the grave with holy water.

The funeral ceremonies of the Greek church, are much the ſame with thoſe of the Latin. It needs only be obſerved, that, after the funeral ſervice, they kiſs the crucifix, and ſalute the mouth and forehead of the deceaſed: after which each of the company eats a bit of bread and drinks a glaſs of wine in the church, wiſhing the ſoul a good repoſe, and the afflicted family all conſolation.

FUNERAL-*Games*, a part of the ceremony of the ancient funerals.

It was cuſtomary for perſons of quality, among the ancient Greeks and Romans, to inſtitute games, with all ſorts of exerciſes, to render the death of their friends more remarkable. This practice was generally received, and is frequently mentioned by ancient writers. Patroclus's funeral games take up the greateſt part of one of Homer's Iliads; and Agamemnon's ghoſt is introduced by the ſame poet telling the ghoſt of Achilles, that he had been a ſpectator at a great number of ſuch ſolemnities.

The celebration of theſe games among the Greeks, moſtly conſiſted of horſe-races; the prizes were of different ſorts and value, according to the quality and magnificence of the perſon that celebrated them. The garlands, given to victors on this occaſion, were uſually of parſly, which was thought to have ſome particular relation to the dead.

Thoſe games, among the Romans, conſiſted chiefly of proceſſions; and ſometimes of mortal combats of gladiators around the funeral pile. They, as well as the Greeks, had alſo a cuſtom, though very ancient, of cutting the throats of a number of captives before the pile, as victims to appeaſe the manes of the deceaſed. Cæſar relates, that the Gauls had this cuſtom.

The funeral games were aboliſhed by the emperor Claudius.

Funeral-*Oration*, a diſcourſe pronounced in praiſe of a perſon deceaſed, at the ceremony of his funeral.

This cuſtom is very ancient, both among the Greeks and Romans. Before the company departed from the ſepulchre, they were often entertained with a panegyric upon the dead perſon, always pronounced by a near relation, or one of the public magiſtrates.

FUNGI (from σφογγος, *fungus*), one of the ſeven families or tribes of the vegetable kingdom, according to Linnæus, comprehending all thoſe who are of the muſhroom kind, and which in Tournefort conſtitute the 2d, 3d, 4th, 5th, 6th, 7th, and 8th genera of the firſt ſection in the claſs xvii.

Fungi, an order of plants in the *fragmenta methodi naturalis* of Linnæus. See Botany, p. 1317.

FUNGIBLES, in Scots law, are ſuch things as are eſtimated by number, weight, or meaſure; as, coin, butter, ale, &c.

FUNGITÆ, in natural hiſtory, a kind of foſſile coral, of a conic figure, though ſometimes flatted and ſtriated longitudinally.

FUNGUS, in ſurgery, denotes any ſpongy excreſcence. See Surgery.

FUNNEL *of a* Chimney, the ſhaft or ſmalleſt part of the waſte, where it is gathered into its leaſt dimenſions.

Palladio directs, that the funnels of chimneys be carried through the roof four or five feet at leaſt, that they may carry the ſmoke clear from the houſe into the air. See the article Chimney.

He alſo adviſes, that chamber-chimneys be not made narrower than 10 or 11 inches, nor broader than 15: for if too narrow, the ſmoke will not be able to make its way; and, if too wide, the wind will drive it back into the room.

FUR, or Furr, in commerce. See Furr.

FURBISHER, a perſon who furbiſhes, poliſhes, or cleans arms, as guns, ſwords, piſtols, &c.; which is chiefly performed with emery. See the article Emery.

FURCA, in antiquity, a piece of timber reſembling a fork, uſed by the Romans as an inſtrument of puniſhment.

The puniſhment of the furca was of three kinds: the firſt only ignominious, when a maſter, for ſmall offences, forced a ſervant to carry a furca on his ſhoulders about the city. The ſecond was penal, when the party was led about the circus, or other place, with the furca about his neck, and whipped all the way. The third was capital, when the malefactor having his head faſtened on the furca, was whipped to death.

FURCHE', in heraldry, a croſs forked at the ends.

FURIES, in Pagan antiquity, certain goddeſſes whoſe office it was to puniſh the guilty after death. They were three in number: Alecto, Megæra, and Tiſiphone; who were deſcribed with ſnakes inſtead of hair, and eyes like lightening, carrying iron chains and whips in one hand, and in the other flaming torches; the latter to diſcover, and the former to puniſh, the guilty: and they were ſuppoſed to be conſtantly hovering over ſuch perſons as had been guilty of any enormous crime.

Mythologiſts ſuppoſe, that Tiſiphane puniſhed the crimes which ſprang from hatred or anger; Megæra, thoſe from envy; and Alecto, thoſe from an inſatiable purſuit after riches and pleaſure. They were worſhipped at Caſina in Arcadia, and at Carmia in Peloponneſus. They had a temple at Athens, near the Areopagus, and their prieſts were choſen from amongſt the judges of that court. At Telphuſia, a city in Arcadia, a black ewe was ſacrificed to them.

FURIUS (Bibaculus), a Latin Poet, flouriſhed about 103 B. C. He wrote annals in verſe, of which Macrobius recites ſome fragments. Suetonius alſo relates ſome verſes of his on Valerius Cato, in his *Illuſtrious Grammarians*.

FURLING, in the ſea language, ſignifies the wrapping up and binding any ſail cloſe to the yard; which is done by hawling upon the clew-lines, buntlines, &c. which wraps the ſail cloſe together, and being bound faſt to the yard the ſail is furled.

FURLONG, a long meaſure, equal to one eighth of a mile, or 40 poles.

It is alſo uſed in ſome law-books, for the eighth part of an acre.

FURLOUGH, in the military language, a licence granted by an officer to a ſoldier, to be abſent for ſome time from his duty.

FURNACE, an utenſil, or veſſel, proper to contain fire, or to raiſe and maintain a vehement fire in, whether of coal or wood.—Of theſe there are a great variety, according to the different uſes to which they are applied.

Plate CVIII. fig. 4.

Cramer's Art of Aſſaying.

An *Eſſay* or *Cupelling* Furnace is made in the following manner. 1. Make with iron plates a hollow quadrangular priſm, eleven inches broad and nine inches high (*aa*, *bb*), ending at top in a hollow quadrangular pyramid (*bb*, *cc*) ſeven inches high, terminating in an aperture at top ſeven inches ſquare. This priſm muſt be cloſed at bottom with another iron plate, which ſerves as a baſis or bottom to it (*aa*). 2. Near the bottom make a door (*e*), three inches high, and five inches broad, that leads to the aſh-hole. 3. Above this door, and at the height of ſix inches from the baſis, make another door (*f*), of the figure of a ſegment of a circle, four inches broad at its baſis, and three inches and a half high in the middle. 4. Then faſten three iron plates on the forepart of this furnace. Let the firſt of them (*gg*), eleven inches long and half an inch high, be faſtened, ſo that its lower edge ſhall reſt againſt the bottom of the furnace, with three or four rivets; and in ſuch a manner, that there may be between the upper edge of the ſaid plate and the ſide of the furnace a groove ſo wide, as that the ſliders of the lower door (*kk*) may be put into it, and freely move backwards and forwards therein: theſe muſt be made of a thicker iron-plate. The ſecond iron-plate (*hh*), eleven inches long, three inches high, and perfectly parallel to the foregoing plate, muſt be faſtened in the ſpace between the two doors, in ſuch manner that both the upper and the lower edges of it may form a hollow groove with the ſide of the furnace. One of theſe grooves, which is turned downwards, ſerves to receive the upper edge of the ſliders that ſhut the lower door (No. 2). The other, that turns upwards, is to receive the inferior edges of the ſliders of the ſmall door above (No. 3). The third plate (*ii*), which is like the firſt, muſt be rivetted cloſe above the upper door, in ſuch manner, that it may form a groove turning downwards, and contiguous to the upper edge of the upper door (No. 3.) 5. In order to ſhut both doors (No. 2, 3.), you muſt adapt to each of them two ſliders made of iron-plates, that may move within the above-mentioned grooves (*kk, ll*). But the two ſliders belonging to the upper door (No. 3.) muſt have each a hole near the top; that is, one a ſmall hole one fifth part of an inch broad, and one inch and a half long (*m*); and the other a ſemicircular aperture, one inch high and two inches broad (*n*). Let, beſides, each ſlider have a handle, that they may be laid hold of when they are to be moved. 6. Moreover, let five round holes, one inch broad, be bored in the furnace; two of which muſt be made in the fore-part of the furnace (*oo*), two others in the back part; all at the height of five inches from the bottom, but three inches and a half diſtant from each ſide, of the furnace; and, finally, a fifth hole (*p*), at the height of one inch above the upper edge of the upper door (*f*). 7. In ſhort, let the inſide of the furnace be armed with iron-hooks, jetting out half an inch, and about three inches diſtant from each other, to faſten the lute with which the furnace is to be covered over within. 8. Let then an iron, moveable, hollow, quadrangular pyramid (*g*), three inches high, be adapted to the upper aperture (*d*) of the furnace, at the baſis ſeven inches broad, ending upwards in a hollow tube (*r*), three inches in diameter, two inches high, almoſt cylindrical, though ſomewhat convergent at top. This prominent tube ſerves to ſupport a funnel or flue, which is almoſt cylindrical, hollow, made of iron-plates, and two foot high; and which, when a very ſtrong fire is required, is put perpendicularly upon the ſhorter tube, in ſuch a manner, that it enters cloſe into it, one inch and a half or two inches deep, and may again be taken off at pleaſure, when there is no need of ſo ſtrong a fire. But this pyramidal cover (*q*) muſt beſides have two handles (*ss*) adapted to it, that it may be laid hold of, and thus be taken away or put on again: and that this, being put on the aperture (*d*) of the furnace, may not be eaſily thrown down, let an iron plate be rivetted to the right and left upper edge of the furnace (*cc*), and be turned down towards the inſide, ſo as to make a furrow open before and behind, into which the lateral edges of the cover may enter and be faſtened, and at pleaſure be moved backwards and forwards, whenever it muſt be put on, or moved. 9. Let a ſquare ledge, made of a thick iron-plate, be faſtened at top of the upper edge of the lower door (*e*): this is deſigned to ſupport the grate and the lute; but it muſt be made of two pieces, that it may be eaſily introduced into the cavity of the furnace. Thus you will have an aſſay-oven, which muſt afterwards be covered over on the inſide with lute. This you are to do as follows:

That the fire may be better confined, and that the iron may not be deſtroyed by growing red-hot, the whole inſide of the furnace muſt be covered over with lute, one finger or one finger and a half thick. The lute fit for this is deſcribed under the article CHEMISTRY, n° 78, 81. But before you cover the inſide of your furnace with this lute, you muſt firſt put within the furnace ſmall iron bars, equal in length to the diameter of the oven, quadrangular, priſmatical, half an inch thick, having their extremities ſupported by a ſquare iron ledge, and three fourths of an inch diſtant from each other; and you muſt faſten them ſo, that their flat ſides may be oblique with regard to the tranſverſe ſection of the furnace, and that the two oppoſite angles may look one upwards and the other downwards: the bars muſt not be laid flat, but edgewiſe; by which ſituation you hinder the aſhes of the fuel of the fire from being detained too long between the interſtices of the ſaid iron-bars, and from making an obſtruction that would oppoſe the free draught of the air. The furnace being then covered over with lute, and dried up by a gentle heat, is at laſt fit for docimaſtical operations, and eſpecially for ſuch as muſt be performed in the aſſay-oven.

If then an operation is to be made in the furnace hitherto deſcribed, you muſt let through the four lower holes above deſcribed of the furnace (*oo*) placed before and behind, and directly oppoſite to each other, two iron-bars one inch thick, and long enough that their extremities on every ſide may jut out of the holes a ſmall matter. Theſe ſerve to ſupport the muffle and its bottom. You then introduce the muffle through the upper aperture of the furnace (*d*), and place it upon the above deſcribed iron-bars, in ſuch a manner, that the open fore-ſide of it be contiguous to the inward border of the upper door (*f*). The fuel of the fire is introduced through the top of the furnace (*d*); the cover of which (*g*), on this account, muſt be moveable and not very heavy. The beſt fuel for the fire is charcoal made of the hardeſt wood, eſpecially of beech, broken into ſmall pieces of the bigneſs of an inch, wherewith the muffle muſt be covered over ſome inches high. We then reject larger bits of coals, becauſe they cannot fall thro' the narrow interſtices, between the ſides of the muffle and thoſe of the furnace, and cannot of courſe ſufficiently ſurround the circumference of the muffle. Whence it happens, that there are on every ſide places void of fuel, and the fire is either not ſtrong enough or unequal. But if, on the contrary, you uſe coals too ſmall, then a great part fall immediately through the interſtices of the grate into the aſh-hole; and the tendereſt particles of them turn too ſoon into aſhes, and, by increaſing the heap of aſhes, obſtruct the free draught of the air, which is here greatly requiſite.

A perfect management of the fire is moſt commonly neceſſary in the performing of operations in this furnace; therefore the chemical reader muſt give attention to what follows. If the door of the aſh-hole (*e*) is quite open; and the ſliders of the upper door (*f*) drawn towards each other, ſo as to touch one another in the middle of the door; and if, beſides, the cover (*q*), and the funnel adapted to its tube (*r*), is upon the top (*q*) of the furnace; the fire will be then in the higheſt degree poſſible; though, in the mean time, it is hardly ever neceſſary to put the funnel on, except in a very cold ſeaſon: but if, after having diſpoſed the furnace in the manner juſt deſcribed, you put red burning coals into the open upper door (*f*) of it, the fire is ſtill more increaſed thereby: however, this artifice is never, or very ſeldom, neceſſary. When you ſhut the upper door with only that ſlider that has a narrow oblong

long hole in it (*m*), then the heat becomes a little leſs; but it diminiſhes ſtill more when you ſhut the door with the other ſlider that has in it the ſemicircular hole (*n*), which is larger than that of the firſt ſlider: nay, the heat again is leſs when you take away the funnel put at the top of the cover: finally, the door of the aſh-hole being either in part or totally ſhut, the heat is ſtill diminiſhed; becauſe the draught of air ſo neceſſary to excite the fire, is thereby hindered: but if, beſides all theſe, you likewiſe open the upper door quite, then the cold air, ruſhing into the muffle, cools the bodies put under it, that are to be changed, to a degree never required in any operation, and ſuch as will entirely hinder the boiling of lead. If, during the operation, the fire begins to decay, or to grow unequal, it is a ſign that there are places void of coals between the ſides of the furnace and thoſe of the muffle: therefore, in this caſe, you muſt ſtir your coals on every ſide with an iron-rod, which is to be introduced through the upper hole (*p*) of the furnace, that they may fall together, and thus act in a proper manner and equality.

However, you are to obſerve concerning the regimen of the fire juſt deſcribed, that though the apparatus is made with all the exactneſs mentioned, nevertheleſs the effect does not always anſwer it. The cauſe of which difference has moſt commonly its origin in the various diſpoſitions of the air: for as every fire is more excited by coals in proportion as the air, more condenſed, and more quickly agitated, ſtrikes them more violently (which the effect of the bellows plainly ſhews); it thence appears, that in warm and wet weather, when the atmoſphere is light, the fire muſt be leſs efficacious in furnaces; that likewiſe, when ſeveral furnaces, ſituated near each other, are burning at the ſame time, the fire is in part ſuffocated, becauſe the ambient air is thereby rendered more rare and lighter. The ſame effect is produced by the ſun, eſpcially in ſummer-time, when it ſhines upon the place where the furnace is ſituated. The atmoſphere, on the contrary, being heavier in cold dry weather, excites a very great fire.

The heat of the fire acts the ſtronger upon the bodies to be changed, as the muffle put in the furnace is leſs; as the ſaid muffle has more and larger ſegments cut out of it; as the ſides of this muffle are thinner; in ſhort, as there are more veſſels placed in the hinder part of the muffle; and on the contrary. In this caſe, when many of the conditions requiſite for the exciting of fire are wanting, then indeed the artificer, with all his ſkill, will hardly be able to excite the fire to a ſufficient degree, in order to perform operations well, in common aſſay-ovens, even though he uſes bellows, and puts coals into the upper door of the furnace. For this reaſon, the grate ought be put almoſt three inches below the muffle, leſt the air, ruſhing through the aſh-hole, ſhould cool the bottom of the muffle, which happens in common aſſay-ovens; and again, that the ſmaller coals, almoſt already conſumed, and the aſhes, may more eaſily fall through the interſtices of the grate, and the larger coals ſtill ſit to keep up the fire be retained. Laſtly, The above-mentioned funnel is added, that the blowing of the fire being, by means of it, increaſed as much as poſſible, this might at laſt be carried to the requiſite degree; for the fire may always be diminiſhed, but not always be increaſed at pleaſure, without the aſſiſtance of a proper apparatus.

Fig. 5. Repreſents a longitudinal ſection of a *Reverberatory* FURNACE uſed in the ſmelting of ores. 1. The maſonry. 2. The aſh-hole. 3. A channel for the evaporation of the moiſture. 4. The grate. 5. The fire-place. 6. The inner part of the furnace. 7. A baſon formed of ſand. 8. The cavity where the melted metal is. 9. A hole through which the ſcoria is to be removed, 10. The paſſage of the flame and ſmoke, or the lower part of the chimney; which is to ba carried up to a height of about 30 feet. 11. A hole in the roof, through which the ore is thrown into the furnace. This furnace is 18 feet long, 12 feet broad, and 9½ high.

Fig. 6. Repreſents a longitudinal ſection of the *Refining* FURNACE. 1. The maſonry of the pillars and walls ſurrounding the furnace. 2. The channels for carrying off the moiſture. 3. Other ſmall channels which join in the middle of the baſon. 4. The baſon made of bricks. 5. A bed of aſhes. 6. The hollow or baſon in which the metal is melted and refined. 7. The great flame-hole. 8. The two openings for the entry of the tuyeres of the bellows. 9. The vault or dome of the furnace. 10. The fire-place. 11. The grate. 12. The draught-hole. 13. A hole in the vault, which, being opened, ſerves to cool the furnace.

Portable FURNACE. See CHEMISTRY, n° 98, 99.

Melting FURNACE. *Ibid.* n° 101.

Lamp FURNACE, *Ibid.* 2^{d} 102.

Machines for Blowing Air into FURNACES. The earlieſt method of animating large fires in the furnaces where ores were ſmelted, ſeems to have been by expoſing them to the wind. Such was the practice of the Peruvians before the arrival of the Spaniards among them. Alonſo Barba relates, that their furnaces, called *guairas*, were built on eminences, where the air was freeſt; that they were perforated on all ſides with holes, through which the air was driven in when the wind blew, which was the only time when the work could be carried on; that under each hole was made a projection of the ſtone-work, on which were laid burning coals, to heat the air before it entered the furnace. Some authors ſpeak of ſeveral thouſands of theſe guairas burning at once on the ſides and tops of the hills of Potoſi; and ſeveral remains of this practice are to be found in different parts of Great Britain.

This method of ſupplying air being found exceſſively ineffectual and precarious, the inſtruments called *bellows* ſucceeded. Theſe were at firſt worked by the ſtrength of men; but as this was found to be very laborious and expenſive, the force of running water was employed to give motion to theſe machines. Thus a much greater quantity of metal could be procured than formerly, and the ſeparation was likewiſe more complete; inſomuch, that in many places the flags or cinders from which the iron had formerly been extracted were again uſed as freſh ore, and yielded plenty of metal.

But, though this method was found to be greatly preferable to the others, yet great improvements were ſtill wanted. In order to melt very large quantities of ore at a time, it was neceſſary to uſe bellows of an immenſe ſize; and in proportion to their ſize they ſtood in need of the more frequent and expenſive repairs.

The oil, alſo, which the bellows required in large quantity, becoming rancid, was found to generate a kind of inflammable vapour, which ſometimes burſt the bellows with exploſion, and thus rendered them totally uſelſs. A new method, therefore, of blowing up fire, by means altogether free from the abovementioned inconveniences was fallen upon by means of water. It depends on the following principle, viz. That a ſtream of water, running through a pipe, if by any means it is mixed with air at its entrance into the pipe, will carry that air along with it, and part with it again as ſoon as it comes out of the pipe; and if the air is then collected by a proper apparatus, it may with ſucceſs be uſed for exciting the moſt violent degrees of heat.

Machines of this kind are repreſented on Plate CXIV. fig. 4. In the right-hand machine, AB repreſents a ſtream of water falling into the funnel, whoſe throat is contracted at B; after which the ſtream runs thro' the perpendicular pipe EF, in the upper part of which there are ſome ſmall holes repreſented by *c d e f*. Through theſe holes the air has acceſs to mix itſelf with the deſcending water, which being daſhed againſt the ſides of the pipe is reduced to froth, and thus fills the whole cavity of the pipe EF, which is conſiderably larger than the throat of the funnel B. When this frothy ſtream enters the veſſel C, the air extricates itſelf from the water; and as it cannot return through the pipe EF becauſe it is continually filled with a ſtream of liquid matter, it flies off with conſiderable force through the ſmaller pipe D, by which it is conveyed to the furnace.

From this deſcription, it is evident that the principal thing to be kept in view in the conſtruction of theſe machines is, to mix the deſcending ſtream of water with as great a quantity of air as poſſible. For this purpoſe the contrivance repreſented in the left-hand machines anſwers much better than the former. By this the water deſcending from the reſervoir A, falls into a kind of cullender B, perforated with a great number of holes in its ſides. Thus the water being forced out in a number of ſmall ſtreams is very effectually daſhed againſt the ſides of the wide deſcending pipe, when it enters the condenſing veſſel C, and is ſent off by the pipe D, as in the former.

Phil. Com. of Arts, p. 267.

In ſome machines of this kind the conſtructors ſeem to have been of opinion, that a great height was required in the water-fall: but Dr Lewis, who hath made a great number of experiments upon the ſubject, ſhews, that an exceſs in height can never make up for a deficiency in the quantity of the water. Four or five feet, he thinks, is a ſufficient height for the water-fall; where there is a greater height, however, it may be rendered uſeful, by joining two or more machines together in the manner repreſented in the plate; where the water, after having once emitted its air in the condenſing veſſel C, flows out into a new reſervoir E. From thence it deſcends through another cullender F, and deſcending from it into a condenſing veſſel G, the air is extricated, and carried off through the pipe H. The upper figure repreſents the cullender, with the ſhapes of the holes and their proportional diſtances, according to Dr Lewis.

Thus, with very little expence, where there is a ſufficient quantity of water, as ſtrong a blaſt of air as can be deſired may be readily obtained; for ſeveral machines may be conſtructed, and joined together in a manner ſomewhat ſimilar to that above mentioned, until all the quantity of water is employed. It is proper to obſerve, however, that as by this method the air is loaded with moiſture, it is proper to make the condenſing veſſel as high as conveniently may be, that the air may arrive at the furnace in as dry a ſtate as poſſible.—The long ſlender pipes in the left-hand machines repreſent a gage filled with mercury or water, by which the ſtrength of the blaſt may be determined.

FUROR uterinus, a diſorder peculiar to women. See (the *Index* ſubjoined to) Medicine.

FURR, in commerce, ſignifies the ſkin of ſeveral wild beaſts, dreſſed in alum with the hair on; and uſed as a part of dreſs, by princes, magiſtrates, and others. The kinds moſt in uſe are thoſe of the ermine, ſable, caſtor, hare, coney, &c.

FURSTENBURGH, a town and caſtle of Germany, the capital of a county of the ſame name, 30 miles north-weſt of Conſtance. E. Long. 8. 30. N. Lat. 47. 50.

FURTHCOMING, in law, the name of an action competent to any perſon who has uſed arreſtment in the hands of his debtor's creditor, for having the ſubject arreſted declared his property.

FURUNCLE, or Boil, in ſurgery, a ſmall reſiſting tumour, with inflammation, redneſs, and great pain, ariſing in the adipoſe membrane, under the ſkin. See Surgery.

FURZE, in botany. See Ulex; Agriculture, n° 46.; and Fence.

FUSAROLE, in architecture, a moulding or ornament placed immediately under the echinus, in the Doric, Ionic, and Compoſite capitals.

FUSE, or Fuze, in artillery. See Fusee.

FUSEE, in clock-work, is that conical part drawn by the ſpring, and about which the chain or ſtring is wound; for the uſe of which, ſee Clock and Watch.

Fusee, or *Firelock*. See Musquet.

Fusee, *Fuze*, or *Fuſe*, of a bomb or granado, is that which makes the whole powder or compoſition in the ſhell take fire, to do the deſigned execution.

Fuzes are chiefly made of very dry beech-wood, and ſometimes of hornbeam, taken near the root. They are turned rough, and bored at firſt, and then kept for ſeveral years in a dry place; the diameter of the hole is about $\frac{1}{4}$ of an inch; the hole does not come quite through, leaving about $\frac{1}{4}$ of an inch at the bottom; and the head is made hollow, in the form of a bowl.

Military Dict. voce Laboratory.

The compoſition for fuzes is ſaltpetre 3, ſulphur 1, and mealed powder 3, 4, and ſometimes 5. This compoſition is drove in with an iron driver, (whoſe ends are capped with copper to prevent the compoſition from taking fire), and equally hard as poſſible; the laſt ſhovel-full being all mealed powder, and two ſtands of quickmatch laid acroſs each other being drove in with it, the ends of which are folded up into the hollow top, and a cap of parchment tied over it till uſed.

When theſe fuzes are driven into the loaded ſhell, the lower end is cut off in a ſlope, ſo that the compoſition may inflame the powder in the ſhell: the fuze muſt have ſuch a length as to continue burning all the time the ſhell is in its range, and to ſet fire to the powder as ſoon as it touches the ground, which inſtantly burſts into many pieces. When the diſtance of the battery from the object is known, the time of the ſhell's flight may be computed to a ſecond or two; which being known, the fuze may be cut accordingly, by burning two or three, and making uſe of a watch or a ſtring by way of a pendulum to vibrate ſeconds.

FUSIBILITY, in natural philoſophy, that quality of bodies which renders them fuſible.

FUSIL, in heraldry, a bearing of a rhomboidal figure, longer than the lozenge, and having its upper and lower angles more acute and ſharp than the other two in the middle. It is called in Latin *fuſus*, "a ſpindle," from its ſhape.

FUSILIERS, FUSILEERS, or *Fuzileers*, in the military art, are ſoldiers armed as the reſt of the infantry, but wearing caps like the grenadiers, though ſomewhat ſhorter. There are three regiments in the Britiſh ſervice: the royal regiment of Scots fuzileers, raiſed in 1678; the royal regiment of Engliſh fuzileers, raiſed in 1685; and the royal regiment of Welſh fuzileers, raiſed in 1688-9.

FUSION, the ſtate of a body rendered fluid by fire. See FLUIDITY; and CHEMISTRY, n° 35.

FUST, or FAUSTUS, a citizen of Mentz, and one of the earlieſt printers. He had the policy to conceal his art; and to this policy we are indebted for the tradition of "The Devil and Dr Fauſtus," handed down to the preſent times. Fuſt, about 1460, aſſociated with John of Gottenburgh: their types were cut in wood, and fixed, not moveable as at preſent. Having printed off a conſiderable number of copies of the Bible, to imitate thoſe which were commonly ſold in MS, Fuſt undertook the ſale of them at Paris, where the art of printing was then unknown. As he ſold his printed copies for 60 crowns, while the ſcribes demanded 500, this created univerſal aſtoniſhment; but when he produced copies as faſt as they were wanted, and lowered the price to 30 crowns, all Paris was agitated. The uniformity of the copies increaſed the wonder; informations were given into the police againſt him as a magician; his lodgings were ſearched; and a great number of copies being found, they were ſeized: the red ink with which they were embelliſhed was ſaid to be his blood; it was ſeriouſly adjudged that he was in league with the devil; and if he had not fled, moſt probably he would have ſhared the fate of thoſe, whom ignorant and ſuperſtitious judges condemned, in thoſe days, for witchcraft. Fuſt died at Mentz in 1466. See (Hiſtory of) PRINTING.

FUSTIAN, in commerce, a kind of cotton ſtuff, which ſeems as it were whaled on one ſide.

Right fuſtians ſhould be altogether made of cotton-yarn, both woof and warp; but a great many are made, the warp of which is flax, or even hemp.

There are fuſtians made of ſeveral kinds, wide, narrow, fine, coarſe; with ſhag or nap, and without it.

FUSTIAN, is alſo uſed for a bombaſt ſtyle, or a high ſwelling kind of writing made up of heterogeneous parts.

FUSTICK, or FUSTOCK, a yellow wood, that grows in all the Caribbee iſlands, uſed in dying yellow. It pays no duty on importation.

FUSTIGATIO, in the Roman cuſtoms, a puniſhment inflicted by beating with a cudgel. This puniſhment was peculiar to freemen: for the ſlaves were ſcourged or laſhed with whips.

FUTTOCKS, in a ſhip, the timbers raiſed over the keel, or the encompaſſing timbers that make her breadth.

FUZES, or FUSEES, in artillery. See FUSEE.

FUZILEERS. See FUSILEERS.

END OF THE FOURTH VOLUME.

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N. B. ERRATA, OMISSIONS, &c. noticed and ſupplied in the APPENDIX at the end of the Work.